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ABSTRACT

This guide is a training plan for the electrical skills cluster of the Skills Training and Education Program (STEP), an open-entry, open-exit program funded by the Job Training Partnership Act (JTPA). In the STEP training plan, each task has its own lesson plan guide. This manual contains the following information: definitions, instructions for completing the competency chart, instructions for using the lesson plan guide, training course outline, list of modules and tasks, task assignment by exit occupations, lesson plan guides, and references and materials. The lesson plan guides, which make up the bulk of the document, include information on module, task, performance objective, performance guide, reference materials, audiovisuals, performance assignment, instructor evaluation, and learning activities. They are organized in six modules containing 211 lesson plans that cover orientation and safety; applied mathematics; basic electrical information; conduit operations; wiring operations; and electric motors and controls. Appendixes contain a pre-test statement, an outline of job demand characteristics and occupational group arrangements, and a competency chart. (KC)

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STEP Training Plan

for

ELECTRICIAN CLUSTER

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U.S. DEPARTMENT OF EDUCATION
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INTRODUCTION

Welcome to the Skills Training and Education Program (STEP). You are now instructing in a vocational training program which is made possible by the JOB TRAINING PARTNERSHIP ACT (JTPA). This Act is designed to prepare youth and unskilled adults for entry into the labor force and to afford job training programs to economically disadvantaged individuals and others facing serious barriers to employment.

Every trainee who enters your vocational training program has been through an assessment process and is able to meet requirements that are important to attaining success. These requirements include minimum vocational aptitudes, adequate physical and mental abilities, and interest.

Your vocational training program, by necessity, has been designed as an open-entry/open-exit program. You will be receiving trainees throughout the program year. This condition dictates that you must be prepared to teach trainees who will be working on different tasks at the same time. Exit occupations for each program have been identified. An exit occupation is a job for which the trainee may be prepared after successfully completing designated tasks in your vocational training program.

The STEP Training Plan is designed with each task having its own Lesson Plan Guide. You can identify the tasks a trainee needs to learn, assign the task, and document each one as it is successfully completed. The trainees are allowed to work, within reason, at their own rate of speed. This system allows learning to proceed in an orderly manner.

Every possible effort will be made to enable you to conduct a successful training program. Your Skills Center Director and staff will work with you to assist you and your trainees in accomplishing this goal.

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DEFINITION OF TERMS

APTITUDE: "Aptitude is the quickness or ease with which you learn to do something" (1.pp.xv).

CRITICAL APTITUDE: "...average successful performance of workers" (1.Glossary). Critical aptitudes are highly significant for the successful performance of a job and are designated on the Job Demand Characteristics Chart by an asterisk (*). Trainees must meet or exceed the values of each specified critical aptitude in order to enter and successfully complete training.

COMPETENCE: "Achievement of the knowledge, skills, and attitudes required by a worker in order to perform a given occupational task" (2.Glossary).

COMPETENCY: "A description of the ability one possesses when able to perform a given occupational task effectively and efficiently" (2.Glossary).

COMPETENCY-BASED EDUCATION (CBE): "An instructional program that derives its content from verified (validated) tasks and bases assessment on student performance. Learning materials used in these programs identify, verify, and publish in advance of instruction the tasks (competencies) the student is to learn and perform, the criteria by which the student will be evaluated, and the conditions under which evaluation will occur. Instruction emphasizes the ability to do as well as knowing the how and why. Student performance and knowledge are evaluated individually against stated criteria, rather than against group norms" (2.Glossary).

COMPETENCY CHART: The chart contains all assigned tasks to be completed for each exit occupation within a designated STEP Training Plan. It is used to document competence for tasks assigned to trainees based upon their interests, vocational potential, and chosen exit occupation(s).

DICTIONARY OF OCCUPATIONAL TITLES (D.O.T.): A publication of the U.S. Department of Labor which includes standardized and comprehensive descriptions of jobs and related occupational information for approximately 20,000 occupations. In order to more easily locate a specific occupation, a D.O.T. code number has been assigned for each job. Each exit occupation found on the Job Demand Characteristics Chart and Competency Chart has a D.O.T. code number.

EXIT OCCUPATIONS: An exit occupation, also referred to as a "spin-off", is a job for which trainees will be prepared to perform at the entry level upon demonstrating competence for those specific tasks assigned to that exit occupation. Exit occupations are listed on the Competency Chart.

LESSON PLAN GUIDE: A set of directions established to help trainees gain competence for a specific task. Lesson Plan Guides will include the course title, module, task statement, performance objective, performance guide, reference materials, and audiovisual aides necessary to complete each task.

MODULE: A major segment of work comprised of related tasks found on the Competency Chart and each Lesson Plan Guide. May parallel the unit of study concept found in traditional curriculum development.

OCCUPATION: "A specific position requiring the performance of specific tasks...essentially the same tasks are performed by all workers having the same title" (2.Glossary).

OCCUPATIONAL CLUSTER: "A grouping of jobs that are related by the similarity of the tasks performed by the various workers" (2.Glossary).

OPEN-ENTRY/OPEN-EXIT: "Open-entry/open-exit enrollment is an administrative device designed to make competency-based and individualized instruction more feasible and useful. It simply allows the trainee to: 1) enter the vocational program at virtually any time an appropriate workstation is available, and 2) exit the program without penalty whenever the specified competencies or tasks have been achieved or when an alternative decision has been made. Thus, trainees are not enrolled or discharged on only a few dates in the year. Neither are they arbitrarily required to remain enrolled in a program for a stipulated number of weeks, months, or years" (2.Glossary).

PERFORMANCE-BASED TRAINING (PBT): "A term that means the same as CBE; is preferred by industry" (2.Glossary).

PERFORMANCE OBJECTIVE: "A statement in measurable terms of what the learner must do to master a task or outcome. It consists of three parts: 1) the conditions under which the task or outcome will be performed for evaluation, 2) a description of the task or outcome, and 3) the standard or criteria which states how well and how fast the task or outcome must be performed for mastery" (2.Glossary).

PERFORMANCE STANDARD: "Criteria which the worker must meet when performing a task" (2.Glossary).

SKILL: "The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, effective, and psychomotor" (2.Glossary).

THE SYSTEM FOR ASSESSMENT AND GROUP EVALUATION (SAGE): An assessment system used by the local Assessment Centers for determining a trainee's mathematics (M) and language (L) levels and for measuring eleven vocational aptitudes.

TASK: "A work activity that has a definite beginning and ending, is observable or measurable, consists of two or more definite steps, and leads to a product, service, or decision" (2.Glossary).

TASK LIST: "A listing of the duties and tasks performed by workers in a given occupation, usually verified (validated) by workers and/or immediate supervisors" (2.Glossary).

TASK STATEMENT: "A description of a meaningful unit of work that contains an action verb and an object that receives the action (it may also contain one or more qualifiers) and represents a typical job assignment that an employer or customer would pay for" (2.Glossary).

VOCATIONAL APTITUDES: "..are defined as the specific capacities or abilities required of an individual in order to facilitate the learning of some task or job duty" (3:pp.1511). The U.S. Department of Labor has identified eleven (11) vocational aptitude requirements which are necessary for job success. These aptitudes are as follows: intelligence (G), verbal (V), numerical (N), spatial (S), form perception (P), clerical perception (Q), motor coordination (K), finger dexterity (F), manual dexterity (M), eye-hand-foot coordination, (E) and color discrimination (C). Each job found within the D.O.T. has a unique set of vocational aptitudes which constitute a vocational aptitude profile for that job. If a trainee's tested aptitudes found on the SAGE meet or exceed the critical aptitudes listed for an exit occupation, this is one factor that Assessment Center staff will take under advisement when considering an applicant for entry in a class-room training program.

REFERENCE AND MATERIALS

1. Winefordner, D.W. Worker Trait Group Guide (First ed.). Appalachia Educational Laboratory. Bloomington, Il.: McKnight Publishing Co., 1978.
2. The Center For Instructional Development and Services. Open Entries: A Competency-Based Education Information Exchange, 7, 1987.
3. Kerns, A.F. and Neeley, R.E. Dictionary of Worker Traits: Volume Two. Philadelphia: Vocational Research Institute, 1987.

II. INSTRUCTIONS FOR COMPLETING THE COMPETENCY CHART

All trainees shall have a Competency Chart for use in the training program. It is the responsibility of the instructor to see that the charts are properly completed. SEE APPENDIX C. The following procedure should be followed in order to properly complete the Competency Chart:

PRE-TEST

1. After the trainees are assessed in the Assessment Center and are enrolled in a vocational program, the instructor will give them a copy of the appropriate Competency Chart. The vocational instructor will discuss each task and performance objective with the trainees.

2. The trainees will CIRCLE every task number that they believe they can presently perform. **THE TRAINEES WILL COMPLETE TASKS RELATED TO SAFETY PRIOR TO PRE-TESTING.** A testing situation will be arranged in order for the instructor to evaluate the trainees' knowledge and performance. Should the trainees' performance meet the criteria as stated in the Performance Objective found on the Lesson Plan Guide, the instructor will date the column marked Date of Pre-Test. The instructor will also write the date on the Date Competency Demonstrated column, initial the column titled Instructor's Initials and the trainees will initial the column titled Trainee's Initials. A task successfully demonstrated during the Pre-Test time will not be taught.

   If trainees are unable to perform a pre-test task as described in the Performance Objective, then the task will be included as a regularly scheduled learning activity.

   THE INSTRUCTOR MAY START THE TRAINEES ON ASSOCIATED TASKS FOR THE SAKE OF CLASSROOM MANAGEMENT AND DEVELOPING A KNOWLEDGE BASE BEFORE THE PRE-TEST PROCEDURE IS COMPLETED.

3. When the Pre-Test procedure is completed, the trainees will sign a Pre-Test Statement (STEP Form 58). This form will be held in the trainees' permanent files and will be used to verify the pre-testing procedure.

TASK DOCUMENTATION

4. All tasks that were not documented as having been acceptable to the stated criteria or that the trainees were unable to perform as addressed in item 2 of the pre-test procedure become a part of the trainees' learning activities. The Competency Chart is now to be used as a training plan as well as a document for recording the successful completion of the tasks.

5. The instructor should start the trainees on the tasks required for the lowest level exit occupation found on the Competency Chart. As a rule of thumb, these will generally have the lowest Data People

attain competency for an exit occupation. (see part VI.)

Trainees may also start completing tasks found for an exit occupation that have been designated by the Assessment Center. If you have questions, call your local Assessment Center and ask them to determine which exit occupation you should be preparing your trainee to complete. Trainees may have a different combination of expected exit occupations to complete due to their interests and potential. The "shotgun approach," in which everyone receives the same lesson during the same period of time, must not be used, as its use violates the intent of individualized instruction used in an open-entry/open-exit classroom.

Occasionally you will use group activities for some safety lessons and live work projects. Make sure that these activities are documented in the trainees' files and are directed toward gaining competence in one or more of the designated tasks.

6. When a task is successfully completed, according to the criteria described in the Performance Objective, the instructor will place a date in the Date Competency Demonstrated column. The instructor must also initial the Instructor's Initials column.

   The trainees also have responsibility in documenting the learning procedure. The trainees will initial the Trainee's Initials column. These acts document the completion of an assigned task.

7. This procedure will be repeated until all designated tasks for appropriate exit occupations in the Competency Chart are completed. As previously stated, the completion of the Competency Chart is documentation of the successful attainment of skills in the trainees' chosen vocational program.

SPECIAL INSTRUCTIONS

A successfully completed task should be initialed as soon as it is completed. If this is not possible, no more than three days should elapse before the Competency Chart is initialed.

Each task that is completed must have initials of both the trainee and the instructor completed in ink (no pencils please) and the date completed. Rubber stamps may not be used.

Basic Education instructors should initial tasks which were completed with their assistance.

III. INSTRUCTIONS FOR USING THE LESSON PLAN GUIDE

The Lesson Plan Guide has been designed for both instructor and trainee use. The guide was developed to be used as a management device for the instructor as it facilitates instruction on an individualized basis. It is the instructor's responsibility to insure that all noted learning materials specified for each Lesson Plan Guide are available for the trainee to use. Suggested reference materials and audiovisuals may be substituted provided that an amended Lesson Plan Guide is developed and approved by the Curriculum and Instruction Unit.

The trainee will use a Lesson Plan Guide as a set of directions to follow when completing each task statement. Each Lesson Plan Guide will contain the course title, module, task number, and statement, and the Performance Objective. The second part, Performance Guide, consists of a flow chart and spaces to list Reference Materials, Audiovisuals, Performance Assignment, and Instructor Evaluation. The Lesson Plan Guide may also include attachments such as procedure pages, blueprints, diagrams, etc.

In order to work through the Lesson Plan Guide, the trainee will begin at the first square in the flow chart and follow the instructions, then proceed to square two, three, etc. When the trainee has successfully worked through each square in the flow chart, the task will have been completed.

If the aforementioned procedure is followed, each trainee works independently of all other trainees, and the instructor will become a learning manager who monitors the progress of the trainee.

The best system for both storing and using the Lesson Plan Guides is to place each page in a plastic sheet protector, then place it inside a hanging file, which then is stored in a Crate-A-File. Generally, each Crate-A-File will hold 50 hanging folders. Tabs with the appropriate task number are helpful to both the trainees and the instructors. These supplies are available at most office equipment supply stores.

IV. TRAINING COURSE OUTLINE

OCCUPATIONAL TITLE ELECTRICIAN CLUSTER

Major Units of Instruction

I. Orientation and Safety
II. Applied Mathematics
III. Basic Electrical Information
IV. Conduit Operations
V. Wiring Operations
VI. Electric Motors and Controls

Maximum Number Weeks Per Participant 52

Exit Occupations Available for This Course of Study

Television-Cable Installer Helper
(821.664-010)

Electric Motor Assembler
(721.684-022)

Parts Clerk
(279.357-062)

Conduit/Pipe Installer
(869.381-018)

Equipment Installer Helper
(Telephone)
(822.664-014)

Protective-Signal-Installer/
Repairer Helper
(822.664-010)

Electrician Helper (Any Industry)
(829.684-022)

Electrician, Residential (Entry level)
(824.261-010)

Electrician, Commercial (Entry level)
(824.261-010)

Electrician, Industrial (Entry level)
(824.261-010)

This is an Individualized and Competency Based Curriculum Utilizing an Open Entry/Open Exit Matriculation Schedule.

V. LIST OF MODULE AND TASKS

ELECTRICIAN CLUSTER

MODULE I. ORIENTATION AND SAFETY
TASK 1. APPLY SCHOOL POLICIES AND PROCEDURES.
2. APPLY SHOP SAFETY RULES AND PROCEDURES.
3. APPLY FIRE SAFETY RULES AND PROCEDURES.
4. APPLY ELECTRICAL SAFETY RULES AND PROCEDURES.
5. COMPLETE APPROVED CPR TRAINING.

MODULE II. APPLIED MATHEMATICS
TASK 6. ADD WHOLE NUMBERS.
7. SUBTRACT WHOLE NUMBERS.
8. MULTIPLY WHOLE NUMBERS.
9. DIVIDE WHOLE NUMBERS.
10. ADD COMMON FRACTIONS.
11. SUBTRACT COMMON FRACTIONS.
12. MULTIPLY COMMON FRACTIONS.
13. DIVIDE COMMON FRACTIONS.
14. ADD DECIMAL FRACTIONS.
15. SUBTRACT DECIMAL FRACTIONS.
16. MULTIPLY DECIMAL FRACTIONS.
17. DIVIDE DECIMAL FRACTIONS.
18. SOLVE PROBLEMS USING DECIMAL AND COMMON FRACTION EQUIVALENTS.
19. SOLVE PROBLEMS USING PERCENT AND PERCENTAGE.
20. SOLVE PROBLEMS USING AVERAGES AND ESTIMATES.
21. SOLVE PROBLEMS USING LENGTH MEASUREMENTS.
22. SOLVE PROBLEMS USING AREA MEASUREMENTS.
23. SOLVE PROBLEMS USING VOLUME AND MASS MEASUREMENTS.
24. SOLVE PROBLEMS USING ENERGY AND TEMPERATURE MEASUREMENTS.
25. SOLVE RATIO PROBLEMS.
26. SOLVE PROPORTION PROBLEMS.
27. APPLY PRINCIPLE OF REPRESENTATION IN FORMULAS.
28. APPLY PRINCIPLE OF REARRANGEMENT IN FORMULAS.
29. APPLY PRINCIPLE OF GENERAL SIMPLE FORMULAS.
30. APPLY OHM'S LAW FORMULA.
31. APPLY PRINCIPLE OF POWER FORMULAS.

MODULE III. BASIC ELECTRICAL INFORMATION
TASK 32. DIAGRAM AND CONNECT A SIMPLE SERIES CIRCUIT.
33. DIAGRAM AND CONNECT A SIMPLE PARALLEL CIRCUIT.
34. DIAGRAM AND CONNECT A COMPLEX CIRCUIT.
35. CONSTRUCT A SIMPLE ELECTROMAGNET.
36. UNDERSTAND BASIC NEC TERMINOLOGY.
37. IDENTIFY AND KNOW PROPER USE OF COMMONLY USED ELECTRICAL TOOLS AND EQUIPMENT.
38. MEASURE AC, DC, VOLTAGE, AND OHMS USING A VOM.
39. CHECK CONTINUITY AND MEASURE RESISTANCE USING OHMMETER.
40. USE CLAMP-ON AMPMETER TO MEASURE CURRENT IN A CIRCUIT.

MODULE IV. CONDUIT OPERATIONS
TASK 41. IDENTIFY COMMONLY USED CONDUIT.

42. CUT AND DEBURR RIGID CONDUIT TO LENGTH USING A HACKSAW AND A PIPE CUTTER.
43. CUT A STANDARD LENGTH THREAD ON RIGID CONDUIT USING A DROP-HEAD RATCHET THREADER.
44. MAKE BOX OFFSET BENDS IN RIGID CONDUIT USING A HICKEY.
45. USE IN-THE-AIR TECHNIQUES TO BEND RIGID CONDUIT.
46. MAKE A 90 DEGREE BEND IN RIGID CONDUIT.
47. CORRECT AN OVERBEND IN RIGID CONDUIT.
48. MAKE BACK-TO-BACK BENDS IN RIGID CONDUIT.
49. BEND A 30 DEGREE OFFSET IN RIGID CONDUIT.
50. BEND A 45 DEGREE OFFSET TO PASS AN OBSTRUCTION USING RIGID CONDUIT.
51. MAKE A THREE-BEND SADDLE USING RIGID CONDUIT TO CROSS OVER AN OBSTRUCTION.
52. INSTALL AND SECURE RIGID CONDUIT.
53. CUT AND DEBURR THIN-WALL CONDUIT TO LENGTH USING A HACKSAW AND A PIPE CUTTER.
54. MAKE BOX OFFSET BENDS IN THIN-WALL CONDUIT USING AN EMT BENDER.
55. USE IN-THE-AIR TECHNIQUES TO BEND THIN-WALL CONDUIT.
56. MAKE A 90 DEGREE BEND IN THIN-WALL CONDUIT.
57. CORRECT AN OVERBEND IN THIN-WALL CONDUIT.
58. MAKE BACK-TO-BACK BENDS IN THIN-WALL CONDUIT.
59. BEND A 30 DEGREE OFFSET IN THIN-WALL CONDUIT.
60. BEND A 45 DEGREE OFFSET TO PASS AN OBSTRUCTION USING THIN-WALL CONDUIT.
61. MAKE A THREE-BEND SADDLE USING THIN-WALL CONDUIT TO CROSS OVER AN OBSTRUCTION.
62. INSTALL AND SECURE THIN-WALL CONDUIT.
63. INSTALL AND SECURE PVC PLASTIC CONDUIT.
64. INSTALL AND SECURE FLEXIBLE CONDUIT.
65. INSTALL AND SECURE LIQUID TIGHT FLEXIBLE CONDUIT.

MODULE V. WIRING OPERATIONS
TASK 66. IDENTIFY COMMONLY USED WIRE AND CABLE.
67. IDENTIFY COMMONLY USED ELECTRICAL BOXES.
68. MOUNT ELECTRICAL OUTLET BOX TO STUD.
69. INSTALL (BAR-HANGER) MOUNTED JUNCTION BOX.
70. INSTALL SURFACE MOUNT SWITCH AND OUTLET BOX ON A MASONRY WALL. (OPTIONAL)
71. INSTALL GANGABLE BOXES.
72. INSTALL RECESSED FIXTURE HOUSING IN CEILING.
73. MAKE SPLICES USING MECHANICAL-TYPE CONNECTORS (SPLIT BOLT CONNECTORS, LUGS, AND WIRE NUTS).
74. SOLDER AND TAPE A PIGTAIL AND T-SPLICE JOINT.
75. IDENTIFY PROPER USES OF SWITCHES, RECEPTACLES AND FIXTURES.
76. IDENTIFY AND INTERPRET ELECTRICAL SYMBOLS AND DIAGRAMS.
77. DIAGRAM AND INSTALL A SINGLE 115V DUPLEX RECEPTACLE.
78. DIAGRAM AND INSTALL SPLIT CIRCUIT WIRING FOR A SWITCHED DUPLEX RECEPTACLE.
79. DIAGRAM AND INSTALL A GROUND-FAULT INTERRUPTER RECEPTACLE.
80. DIAGRAM AND INSTALL A KEYLESS PORCELAIN LAMPHOLDER WITH SINGLE-POLE SWITCH TO BE CONTROLLED FROM ONE LOCATION.
81. DIAGRAM AND INSTALL SIX KEYLESS PORCELAIN LAMPHOLDERS TO BE CONNECTED IN SERIES.

82. DIAGRAM AND INSTALL SIX KEYLESS PORCELAIN LAMPHOLDERS TO BE CONNECTED IN PARALLEL AND CONTROLLED BY DIMMER SWITCH.
83. DIAGRAM AND INSTALL A LAMP FIXTURE WITH TWO THREE-WAY SWITCHES.
84. DIAGRAM AND INSTALL A LAMP FIXTURE WITH TWO THREE-WAY AND ONE FOUR-WAY SWITCH TO BE CONTROLLED FROM THREE LOCATIONS.
85. DIAGRAM AND INSTALL SIX DUPLEX RECEPTACLES WITH A THREE-WIRE SPLIT CIRCUIT.
86. DIAGRAM AND INSTALL TWO TWO-TUBE FLUORESCENT LAMP FIXTURES USING AN OCTAGON OUTLET BOX WITH BRACKET TO BE CONTROLLED FROM TWO LOCATIONS.
87. DIAGRAM AND INSTALL A PADDLE FAN.
88. DIAGRAM AND INSTALL A LOW VOLTAGE TRANSFORMER FOR DOOR BELL (CHIME) WITH TWO PUSH BUTTON SWITCHES.
89. DIAGRAM AND INSTALL A LOW VOLTAGE INTERCOM SYSTEM.
90. DIAGRAM AND INSTALL TELEPHONE/TELEVISION SIGNAL SYSTEMS.
91. MAKE AN EXTENSION CORD USING MALE AND FEMALE CAPS.
92. DIAGRAM AND INSTALL SPECIAL PURPOSE 220V OUTLET FOR RANGE.
93. DIAGRAM AND INSTALL SPECIAL PURPOSE 220V OUTLET FOR WINDOW AIR CONDITIONER.
94. DIAGRAM AND INSTALL A WATER HEATER WITH A 24 HOUR TIMER.
95. CALCULATE AND LIST GROUP LOADS FOR SERVICE ENTRANCE.
96. INSTALL A SERVICE ENTRANCE 120-240V, SINGLE-PHASE WITH DISTRIBUTION PANEL.
97. DIAGRAM AND INSTALL BRANCH CIRCUITS FROM DISTRIBUTION PANEL TO LIGHTS AND RECEPTACLE OUTLETS.
98. DIAGRAM AND INSTALL 220V, SINGLE-PHASE 60 AMP FUSED DISCONNECT IN CONDUIT FROM MAIN PANEL TO DISCONNECT.
99. TEST CIRCUITS AND INSTALL CIRCUIT BREAKERS IN DISTRIBUTION PANEL. MARK ALL CIRCUITS IN MAIN PANEL.
100. CONNECT ALL CIRCUITS IN MAIN PANEL.
101. TEST ALL CIRCUITS FOR GROUNDS WITH OHMMETER AND TURN ON BREAKER TO ENERGIZE CIRCUITS.
102. TROUBLESHOOT AND REPLACE EXISTING CIRCUIT BREAKERS.
103. TROUBLESHOOT AND REPLACE EXISTING FUSES.
104. TROUBLESHOOT AND REPLACE EXISTING RECEPTACLES.
105. TROUBLESHOOT AND REPLACE EXISTING SWITCHES.
106. TROUBLESHOOT AND REPLACE EXISTING FLUORESCENT BALLAST.
107. TROUBLESHOOT AND REPLACE EXISTING FLUORESCENT TUBES AND TUBE HOLDERS.
108. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A BEDROOM.
109. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A BATHROOM AND PASSAGE.
110. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A HALL AND FRONT ENTRANCE.
111. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A KITCHEN AND REAR ENTRY AND APPLIANCE CIRCUITS FOR KITCHEN.
112. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A LIVING ROOM.
113. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR THE DINING AREAS, PORCH, GARAGE, STORAGE AREA, AND ATTIC.
114. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A GARAGE.
115. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR THE TERRACE, RECREATION ROOM, AND UTILITY ROOM.
116. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR THE LAVATORY, WORKSHOP, AND STORAGE ROOM.
117. DIAGRAM AND INSTALL AN EMERGENCY (BELL) ALARM SYSTEM.
118. DIAGRAM AND INSTALL A SMOKE DETECTOR.

119. DIAGRAM AND INSTALL AN INTRUSION ALARM CIRCUIT USING MOTION DETECTOR AND CLOSED OR OPEN LOOPED CIRCUIT.
120. DIAGRAM AND INSTALL A BATTERY-OPERATED EMERGENCY LIGHTING SYSTEM.
121. UNDERSTAND BASIC NEC REQUIREMENTS FOR THE WIRING OF SWIMMING POOLS, SPAS, HOT TUBS, AND MASSAGE BATH TUBS.
122. UNDERSTAND COMMERCIAL BUILDING PLANS AND SPECIFICATIONS.
123. UNDERSTAND ELECTRICAL SERVICE INSTALLATION PROBLEMS AND PRACTICES IN A COMMERCIAL SETTING.
124. IDENTIFY SYMBOLS AND CALCULATE PLAN DIMENSIONS ON AN ELECTRICAL DRAWING OF A COMMERCIAL BUILDING.
125. DETERMINE SIZE, PROTECTION, AND INSTALLATION OF BRANCH CIRCUITS AND FEEDERS.
126. DETERMINE THE COMPONENTS AND CORRECT CONNECTIONS FOR LOW-VOLTAGE REMOTE-CONTROL LIGHTING.
127. REVIEW PLANS AND DETERMINE JOB REQUIREMENTS ON AN ELECTRICAL DRAWING OF A COMMERCIAL ESTABLISHMENT.
128. SELECT PROPERLY RATED SWITCHES AND RECEPTACLES FOR COMMERCIAL WIRING APPLICATIONS.
129. DIAGRAM AND INSTALL CIRCUIT WITH A SINGLE-POLE SWITCH WITH FEED AT SWITCH.
130. DIAGRAM AND INSTALL A WEATHER RESISTANCE OR EXPLOSION PROOF LIGHT AND SWITCH IN RIGID CONDUIT.
131. DIAGRAM AND INSTALL CIRCUIT WITH A SINGLE-POLE SWITCH WITH FEED AT LIGHT.
132. DIAGRAM AND INSTALL CIRCUIT WITH TWO THREE-WAY SWITCHES CONTROLLING TWO LUMINARIES WITH SOURCE AT ONE LUMINAIRE.
133. DIAGRAM AND INSTALL CIRCUIT WITH TWO THREE-WAY SWITCHES AND A FOUR-WAY SWITCH CONTROLLING A LIGHT.
134. SELECT CORRECT MATERIALS FOR THE INSTALLATION OF BRANCH CIRCUIT WIRING.
135. USE THE NEC TO KNOW HOW TO INSTALL APPLIANCE CIRCUITS IN A COMMERCIAL BUILDING.
136. LIST MATERIALS FOUND IN AN ELECTRICAL DRAWING.
137. UNDERSTAND THE INSTALLATION REQUIREMENTS FOR A SURFACE METAL RACEWAY, MULTI-OUTLET ASSEMBLIES, COMMUNICATION CIRCUIT AND FLOOR OUTLETS.
138. DIAGRAM AND INSTALL A SINGLE-POLE SWITCH WITH LIGHT USING SURFACE METAL RACEWAY.
139. DIAGRAM AND INSTALL THREE RECEPTACLE OUTLETS USING SURFACE METAL RACEWAY.
140. PERFORM BRANCH CIRCUIT CALCULATIONS FOR A COMMERCIAL BUILDING.
141. LIST THE PARTS, TYPES, AND OPERATING CHARACTERISTICS OF LAMPS USED IN COMMERCIAL BUILDING.
142. UNDERSTAND HOW TO INSTALL LIGHTING OUTLETS AND FIXTURES IN A COMMERCIAL SETTING.
143. DIAGRAM AND KNOW HOW TO CONNECT OWNER'S CIRCUITS FOR A COMMERCIAL BUILDING.
144. UNDERSTAND INSTALLATION REQUIREMENTS FOR EMERGENCY POWER SYSTEMS.
145. USE NEC TO SELECT PROPER FUSES AND CIRCUIT BREAKERS IN A COMMERCIAL SETTING.
146. COMPLETE SHORT-CIRCUIT CALCULATIONS.
147. SELECT A PANEL BOARD AND FEEDER SIZE GIVEN THE BRANCH CIRCUITS AND LOAD.
148. READ AND INTERPRET SITE PLANS.

149. IDENTIFY PARTS OF A UNIT SUBSTATION AND SELECT PROPER CONNECTIONS.
150. IDENTIFY DIFFERENT TYPES OF BUSWAYS AND LIST COMPONENTS.
151. IDENTIFY BASIC FUNCTIONS OF ELECTRIC PANEL.
152. UNDERSTAND HOW TO INSTALL TROLLEY BUSWAYS.
153. DESCRIBE HOW TO INSTALL SIGNALING SYSTEMS.
154. DESCRIBE THE VARIOUS TYPES OF MOTORS AND CONTROLLERS USED IN AN INDUSTRIAL SETTING.
155. IDENTIFY LIGHTING PROTECTION PROCEDURES USED IN AN INDUSTRIAL SETTING.
156. DESCRIBE BASIC OPERATIONS OF PROGRAMMABLE LOGIC CONTROLLERS.

MODULE VI. ELECTRIC MOTORS AND CONTROLS

TASK 157. IDENTIFY BASIC PARTS OF A THREE-PHASE SQUIRREL-CAGE INDUCTION MOTOR.
158. DESCRIBE HOW ELECTROMECHANICAL AND SOLID-STATE RELAYS WORK.
159. DEFINE THE OPERATIONS OF AN ACROSS-THE-LINE STARTER AND UNDERSTAND ITS BASIC APPLICATIONS.
160. DEFINE THE BASIC USE OF A MANUAL STARTING COMPENSATOR.
161. IDENTIFY THE BASIC PARTS AND MAJOR APPLICATIONS OF A THREE-PHASE, WOUND-ROTOR INDUCTION MOTOR.
162. IDENTIFY THE BASIC USE AND APPLICATION OF MANUAL SPEED CONTROLLER.
163. IDENTIFY THE BASIC TYPES OF CONTROLLERS AND THEIR APPLICATION USED ON THREE-PHASE AC MOTORS.
164. UNDERSTAND BASIC MOTOR MAINTENANCE ACTIVITIES.
165. PERFORM CONTINUITY TEST FOR MOTOR WINDINGS ON A THREE-PHASE AC MOTOR.
166. REPLACE AND LUBRICATE SLEEVE AND/OR BALL BEARINGS ON AN AC MOTOR ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
167. CLEAN AND LUBRICATE AN AC MOTOR ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
168. DESCRIBE THE OPERATION OF BASIC SINGLE-PHASE INDUCTION MOTORS.
169. IDENTIFY AND DESCRIBE THE BASIC OPERATION AND CONSTRUCTION OF REPULSION MOTORS.
170. UNDERSTAND THE BASIC OPERATIONS OF A UNIVERSAL MOTOR.
171. UNDERSTAND THE BASIC PRINCIPLES OF MOTOR CONTROL.
172. UNDERSTAND THE BASIC OPERATIONS OF MANUAL STARTERS.
173. DESCRIBE THE BASIC OPERATION OF MAGNETIC STARTERS.
174. IDENTIFY THE BASIC APPLICATIONS OF A PUSH BUTTON CONTROL DEVICE.
175. IDENTIFY THE OPERATION AND USE OF MAGNETIC RELAYS AND CONTACTORS.
176. IDENTIFY THE BASIC TYPES AND OPERATIONS OF TIMING RELAYS.
177. DESCRIBE CONNECTIONS NECESSARY TO STOP MOTORS USING PRESSURE SWITCHES AND REGULATORS.
178. DESCRIBE THE BASIC FUNCTIONS OF FLOAT SWITCHES.
179. DESCRIBE THE BASIC FUNCTIONS OF FLOW SWITCHES.
180. DESCRIBE THE USE OF LIMIT SWITCHES.
181. DESCRIBE THE PURPOSE OF PHASE FAILURE RELAYS.
182. DESCRIBE THE FUNCTION OF TWO-WAY AND FOUR-WAY SOLENOID VALVES.
183. IDENTIFY THE BASIC USES OF TEMPERATURE SWITCHES.
184. IDENTIFY THE BASIC SYMBOLS USED IN MOTOR CONTROL SCHEMATICS AND DIAGRAMS.
185. INTERPRET AND DRAW BASIC LINE DIAGRAMS.
186. UNDERSTAND FUNCTIONS AND APPLICATIONS OF TWO-WIRE CONTROL DEVICES.

187. UNDERSTAND THE BASIC APPLICATIONS OF THREE-WIRE AND SEPARATE CONTROL CIRCUITS.
188. UNDERSTAND THE APPLICATION OF HAND-OFF AUTOMATIC CONTROL DEVICES.
189. INTERPRET LINE DIAGRAMS USING MULTIPLE PUSH-BUTTON STATIONS.
190. INTERPRET WIRING AND LINE DIAGRAMS OF REVERSING AND INTERLOCKING CONTROLS.
191. UNDERSTAND SEQUENCE CONTROL OPERATIONS WITH MOTORS.
192. DEFINE THE PROCESS, PURPOSE AND OPERATION OF JOGGING CONTROLS.
193. UNDERSTAND THE BASIC OPERATION OF DIRECT AND PULLEY DRIVES.
194. DEFINE THE FUNCTION AND APPLICATION OF GEAR MOTORS.
195. UNDERSTAND THE USE AND OPERATION OF VARIABLE FREQUENCY DRIVES.
196. UNDERSTAND THE BASIC OPERATIONS AND APPLICATIONS OF MAGNETIC CLUTCHES AND DRIVES.
197. UNDERSTAND THE BASIC OPERATIONS OF DC VARIABLE SPEED CONTROL MOTOR DRIVES.
198. DEMONSTRATE MOTOR START-UP AND TROUBLESHOOTING KNOWLEDGE.
199. DIAGRAM AND CONNECT A SWITCH TO OPERATE A RELAY AND MOTOR.
200. DIAGRAM AND CONNECT A SEPARATE CONTROL CIRCUIT TO OPERATE A MOTOR.
201. DIAGRAM AND CONNECT A PUSH-BUTTON STATION TO OPERATE A RELAY AND MOTOR.
202. DIAGRAM AND CONNECT A MECHANICALLY HELD RELAY TO CONTROL A LIGHTING LOAD.
203. DIAGRAM AND CONNECT A SELECTOR SWITCH AND A PRESSURE SWITCH TO OPERATE A RELAY AND LOAD.
204. DIAGRAM AND CONNECT TWO PUSH-BUTTON STATIONS TO OPERATE A RELAY AND LOAD.
205. DIAGRAM AND CONNECT TWO PUSH-BUTTON STATIONS TO OPERATE A RELAY AND MOTOR SO ONE MUST START BEFORE THE OTHER.
206. DIAGRAM AND CONNECT TWO PUSH-BUTTON STATIONS TO OPERATE A RELAY AND MOTOR ONLY ONE CAN WORK AT A TIME THROUGH AUXILIARY CONTACT INTERLOCKS.
207. DIAGRAM AND CONNECT A MOTOR STARTER WITH A START-STOP AND JOG-PUSH-BUTTON CONTROL STATION.
208. DIAGRAM AND CONNECT A START-STOP JOGGING CIRCUIT USING A TWO-POSITION SELECTOR SWITCH.
209. DIAGRAM AND CONNECT A REVERSING CONTROL PUSH-BUTTON INTERLOCK.
210. DIAGRAM AND CONNECT TWO FORWARD AND TWO REVERSE CONTROL STATIONS WITH PUSH-BUTTON AND AUXILIARY CONTACT INTERLOCK.
211. DIAGRAM AND CONNECT A FORWARD-REVERSE CONTROL CIRCUIT WITH JOGGING IN EACH DIRECTION.

VI. TASK ASSIGNMENT by EXIT OCCUPATIONS

ELECTRICIAN CLUSTER

Television-Cable Installer Helper (821.664-010)	1-5, 6-22, 37, 73, 76, 90
Electric Motor Assembler (721.684-022)	1-5, 6-22, 32-40, 157, 164, 166, 167
Parts Clerk (279.357-062)	1-5, 6-22, 32-40, 41-43, 53, 66, 67, 75, 141, 145, 150, 154, 157
Conduit/Pipe Installer (869.381-018)	1-5, 6-13, 32-37, 41-65, 66, 67, 76
Equipment Installer Helper (Telephone) (822.664-014)	1-5, 6-31, 32-40, 53-65, 73, 76, 90
Protective-Signal-Installer/ Repairer Helper (822.664-010)	1-5, 6-31, 32-40, 41-65, 73, 74, 75, 76, 88-91, 117, 118
Electrician Helper (Any Industry) (829.684-022)	1-5, 6-31, 32-40, 41-65, 66-76, 91
Electrician, Residential (Entry level) (824.261-010)	1-5, 6-31, 32-40, 41-65, 66-121
Electrician, Commercial (Entry level) (824.261-010)	1-5, 6-31, 32-40, 41-65, 66-147
Electrician, Industrial (Entry level) (824.261-010)	1-5, 6-31, 32-40, 41-65, 66-156, 157-211

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 1. ORIENTATION AND SAFETY

TASK - 1. APPLY SCHOOL POLICIES AND PROCEDURES.

PERFORMANCE OBJECTIVE - Given information of school policies and procedures, the trainee will explain school policies and procedures and explain course objectives to the satisfaction of the instructor.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Trainee Orientation Handbook.	A-1	
R-2	Electrician Cluster Manual.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1.	I-1	Oral Review.
P-2	Study R-2.	I-2	
P-3	Discuss with Instructor.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 1. ORIENTATION AND SAFETY

TASK - 2. APPLY SHOP SAFETY RULES AND PROCEDURES.

PERFORMANCE OBJECTIVE - Given examples of electricity jobs and shop situations, the trainee will apply shop safety rules and procedures by identifying safe shop practices at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Shop Safety Rules and Procedures.	**A-1**	
R-2		**A-2**	
R-3		**A-3**	
R-4		**A-4**	
R-5		**A-5**	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1 (Following page).	**I-1**	Oral Review.
P-2	Complete procedures.	**I-2**	
P-3	Go to next task.	**I-3**	
P-4		**I-4**	
P-5		**I-5**	
P-6		**I-6**	
P-7		**I-7**	
P-8		**I-8**	
P-9		**I-9**	
P-10		**I-10**	
P-11		**I-11**	

COURSE: ELECTRICIAN CLUSTER

MODULE: I. ORIENTATION AND SAFETY

TASK: 2. APPLY SHOP SAFETY RULES AND PROCEDURES.

PROCEDURES

1. Identify common hazards in the electricity shop, including:
    a. Improper use of tools
    b. Unguarded machinery
    c. Tripping and falling
    d. Electrical hazards
    e. Improper lifting
2. Identify and explain warning signs posted in the shop area.
3. Explain the importance of "good housekeeping" in the electrical shop.
4. Explain the importance of storing materials in a secure manner.
5. Explain the safety rules and procedures of using equipment.
6. Have instructor evaluate your work.

Source: Alabama Vocational Curriculum Standards Project, Curriculum Standards for Electricity, 1982.

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - I. ORIENTATION AND SAFETY

TASK - 3. APPLY FIRE SAFETY RULES AND PROCEDURES.

PERFORMANCE OBJECTIVE - Given examples of fires, fire extinguishers, possible shop situations, and instructor demonstrations, the trainee will apply fire safety rules and procedures which meet national and local fire safety regulations with 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Fire Safety Rules and Procedures.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1 (Following page).	I-1	Oral Review.
P-2	Complete procedures.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

COURSE: ELECTRICIAN CLUSTER

MODULE: I. ORIENTATION AND SAFETY

TASK: 3. APPLY FIRE SAFETY RULES AND PROCEDURES.

PROCEDURES

1. Identify and explain application for fire extinguishers of the following types:
    a. Foam A/B
    b. Carbon Dioxide B/C
    c. Multi-purpose Dry Chemical A/B/C
2. Describe procedures for operating selected fire extinguishers.
3. Identify potential causes of fire in the shop and common methods for avoiding or preventing fires.
4. Inspect shop for conformity with fire safety rules and procedures.
5. Have instructor evaluate your work.

Source: Alabama Vocational Curriculum Standards Project, Curriculum Standards for Electricity, 1982.

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - I. ORIENTATION AND SAFETY

TASK - 4. APPLY ELECTRICAL SAFETY RULES AND PROCEDURES.

PERFORMANCE OBJECTIVE - Given an orientation to identifying electrical hazards, the trainee will apply and understand proper electrical safety rules and procedures with 100% accuracy and will meet all applicable national, local, and instructor standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → P-3 → I-1 → A-1 → P-4 → P-5 → I-2 → P-6

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Wearing Apparel and Safety"
R-2	Electrical Safety Rules and Procedures.		819-1.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 59-65.	I-1	Check procedures.
P-2	Study R-2 (Following page).	I-2	Grade test (A-1, 100% accuracy).
P-3	Complete procedures.	I-3	
P-4	Study A-1.	I-4	
P-5	Take test.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

COURSE: ELECTRICIAN CLUSTER

MODULE: I. ORIENTATION AND SAFETY

TASK: 4. APPLY ELECTRICAL SAFETY RULES AND PROCEDURES.

PROCEDURES

1. Explain importance of labeling circuit breakers.
2. Explain importance of proper grounding of machines or equipment or electrically operated hand tools.
3. Demonstrate/explain methods for using flexible extension cords, long cables, or drop lights.
4. Identify electrical hazards in the shop.
5. Identify approved locations for all electrical equipment and power sources in the shop.
6. Demonstrate proper procedures for de-energizing circuits by placing tag and pad back on controller.
7. Have instructor evaluate your work.

Source: Alabama Vocational Curriculum Standards Project, Curriculum Standards for Electricity, 1982.

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 1. ORIENTATION AND SAFETY

TASK - 5. COMPLETE APPROVED CPR TRAINING.

PERFORMANCE OBJECTIVE - Given a demonstration and practice by a qualified instructor, the trainee will complete the basic requirements for a Red Cross approved CPR course.

PERFORMANCE GUIDE

START → R-1 → P-1 → I-1 → P-2 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Contact Local Red Cross Chapter for	A-1	
	Class Registration.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Complete training.	I-1	Certificate of Completion. Not
P-2	Go to next task.		a requirement for competency.
P-3		I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 6. ADD WHOLE NUMBERS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will add whole numbers with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Practical Problems in Mathematics For Electricians.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 1-4.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - II. APPLIED MATHEMATICS

TASK - 7. SUBTRACT WHOLE NUMBERS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will subtract whole numbers with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R REFERENCE MATERIALS

R-1 Practical Problems in Mathematics For Electricians.

R-3 ____________

R-4 ____________

R-5 ____________

A AUDIO VISUALS

A-1 ____________

A-2 ____________

A-3 ____________

A-4 ____________

A-5 ____________

P PERFORMANCE ASSIGNMENT

P-1 Study R-1, pp. 5-7.

P-2 Take test.

P-3 Go to next task.

P-4 ____________

P-5 ____________

P-6 ____________

P-7 ____________

P-8 ____________

P-9 ____________

P-10 ____________

P-11 ____________

I INSTRUCTOR EVALUATION

I-1 Grade test.

I-2 ____________

I-3 ____________

I-4 ____________

I-5 ____________

I-6 ____________

I-7 ____________

I-8 ____________

I-9 ____________

I-10 ____________

I-11 ____________

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 8. MULTIPLY WHOLE NUMBERS.

PERFORMANCE OBJECTIVE -Given reading materials and an assignment, the trainee will multiply whole numbers with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Practical Problems in Mathematics	A-1	
	For Electricians.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 8-10.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 9. DIVIDE WHOLE NUMBERS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will divide whole numbers with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Practical Problems in Mathematics	**A-1**	
	For Electricians.	**A-2**	
R-3		**A-3**	
R-4		**A-4**	
R-5		**A-5**	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 11-13.	**I-1**	Grade test.
P-2	Take test.	**I-2**	
P-3	Go to next task.	**I-3**	
P-4		**I-4**	
P-5		**I-5**	
P-6		**I-6**	
P-7		**I-7**	
P-8		**I-8**	
P-9		**I-9**	
P-10		**I-10**	
P-11		**I-11**	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 10. ADD COMMON FRACTIONS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will add common fractions with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Practical Problems in Mathematics	A-1	
	For Electricians.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 17-21.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 11. SUBTRACT COMMON FRACTIONS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will subtract common fractions with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Practical Problems in Mathematics	**A-1**	
	For Electricians.	**A-2**	
R-3		**A-3**	
R-4		**A-4**	
R-5		**A-5**	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 22-24.	**I-1**	Grade test.
P-2	Take test.	**I-2**	
P-3	Go to next task.	**I-3**	
P-4		**I-4**	
P-5		**I-5**	
P-6		**I-6**	
P-7		**I-7**	
P-8		**I-8**	
P-9		**I-9**	
P-10		**I-10**	
P-11		**I-11**	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 12. MULTIPLY COMMON FRACTIONS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will multiply common fractions with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Practical Problems in Mathematics	**A-1**	
	For Electricians.	**A-2**	
R-3		**A-3**	
R-4		**A-4**	
R-5		**A-5**	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 25-27.	**I-1**	Grade test.
P-2	Take test.	**I-2**	
P-3	Go to next task.	**I-3**	
P-4		**I-4**	
P-5		**I-5**	
P-6		**I-6**	
P-7		**I-7**	
P-8		**I-8**	
P-9		**I-9**	
P-10		**I-10**	
P-11		**I-11**	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - II. APPLIED MATHEMATICS

TASK - 13. DIVIDE COMMON FRACTIONS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will divide common fractions with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R REFERENCE MATERIALS

R-1 Practical Problems in Mathematics

For Electricians.

R-3

R-4

R-5

A AUDIO VISUALS

A-1

A-2

A-3

A-4

A-5

P PERFORMANCE ASSIGNMENT

P-1 Study R-1, pp. 28 and 29.

P-2 Take test.

P-3 Go to next task.

P-4

P-5

P-6

P-7

P-8

P-9

P-10

P-11

I INSTRUCTOR EVALUATION

I-1 Grade test.

I-2

I-3

I-4

I-5

I-6

I-7

I-8

I-9

I-10

I-11

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 14. ADD DECIMAL FRACTIONS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will add decimal fractions with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Practical Problems in Mathematics	**A-1**	
	For Electricians.	**A-2**	
R-3		**A-3**	
R-4		**A-4**	
R-5		**A-5**	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 33-36.	**I-1**	Grade test.
P-2	Take test.	**I-2**	
P-3	Go to next task.	**I-3**	
P-4		**I-4**	
P-5		**I-5**	
P-6		**I-6**	
P-7		**I-7**	
P-8		**I-8**	
P-9		**I-9**	
P-10		**I-10**	
P-11		**I-11**	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 15. SUBTRACT DECIMAL FRACTIONS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will subtract decimal fractions with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Practical Problems in Mathematics	A-1	
	For Electricians.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 37-39.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 16. MULTIPLY DECIMAL FRACTIONS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will multiply decimal fractions with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R **REFERENCE MATERIALS**

R-1 Practical Problems in Mathematics For Electricians.

R-3

R-4

R-5

A **AUDIO VISUALS**

A-1

A-2

A-3

A-4

A-5

P **PERFORMANCE ASSIGNMENT**

P-1 Study R-1, pp. 40-42.

P-2 Take test.

P-3 Go to next task.

P-4

P-5

P-6

P-7

P-8

P-9

P-10

P-11

I **INSTRUCTOR EVALUATION**

I-1 Grade test.

I-2

I-3

I-4

I-5

I-6

I-7

I-8

I-9

I-10

I-11

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 17. DIVIDE DECIMAL FRACTIONS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will divide decimal fractions with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	A	**AUDIO VISUALS**
R-1	Practical Problems in Mathematics	A-1	
	For Electricians.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	I	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 43-45.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 18. SOLVE PROBLEMS USING DECIMAL AND COMMON FRACTION EQUIVALENTS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will solve problems involving decimal and common fraction equivalents with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R REFERENCE MATERIALS

R-1 Practical Problems in Mathematics For Electricians.

R-3

R-4

R-5

A AUDIO VISUALS

A-1

A-2

A-3

A-4

A-5

P PERFORMANCE ASSIGNMENT

P-1 Study R-1, pp. 46-48.

P-2 Take test.

P-3 Go to next task.

P-4

P-5

P-6

P-7

P-8

P-9

P-10

P-11

I INSTRUCTOR EVALUATION

I-1 Grade test.

I-2

I-3

I-4

I-5

I-6

I-7

I-8

I-9

I-10

I-11

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 19. SOLVE PROBLEMS USING PERCENT AND PERCENTAGE.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will apply principles of percent and percentage with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Practical Problems in Mathematics	**A-1**	
	For Electricians.	**A-2**	
R-3		**A-3**	
R-4		**A-4**	
R-5		**A-5**	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 52-54.	**I-1**	Grade test.
P-2	Take test.	**I-2**	
P-3	Go to next task.	**I-3**	
P-4		**I-4**	
P-5		**I-5**	
P-6		**I-6**	
P-7		**I-7**	
P-8		**I-8**	
P-9		**I-9**	
P-10		**I-10**	
P-11		**I-11**	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 20. SOLVE PROBLEMS USING AVERAGES AND ESTIMATES.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will apply principles of averages and estimates with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Practical Problems in Mathematics	A-1	
	For Electricians.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 60-62.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 21. SOLVE PROBLEMS USING LENGTH MEASUREMENTS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will apply principles of length measurements with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R REFERENCE MATERIALS		A AUDIO VISUALS	
R-1	Practical Problems in Mathematics For Electricians.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P PERFORMANCE ASSIGNMENT		I INSTRUCTOR EVALUATION	
P-1	Study R-1, pp. 75-78.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 22. SOLVE PROBLEMS USING AREA MEASUREMENTS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will apply principles of area measurements with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Practical Problems in Mathematics	A-1	
	For Electricians.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 79-83.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 23. SOLVE PROBLEMS USING VOLUME AND MASS MEASUREMENTS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will apply principles of volume and mass measurements with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Practical Problems in Mathematics	**A-1**	
	For Electricians.	**A-2**	
R-3		**A-3**	
R-4		**A-4**	
R-5		**A-5**	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 84-88.	**I-1**	Grade test.
P-2	Take test.	**I-2**	
P-3	Go to next task.	**I-3**	
P-4		**I-4**	
P-5		**I-5**	
P-6		**I-6**	
P-7		**I-7**	
P-8		**I-8**	
P-9		**I-9**	
P-10		**I-10**	
P-11		**I-11**	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - II. APPLIED MATHEMATICS

TASK - 24. SOLVE PROBLEMS USING ENERGY AND TEMPERATURE MEASUREMENT.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will apply principles of energy and temperature measurement with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Practical Problems in Mathematics For Electricians.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 89-91.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 25. SOLVE RATIO PROBLEMS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will apply principles of ratio with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Practical Problems in Mathematics For Electricians.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 94 and 95.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - II. APPLIED MATHEMATICS

TASK - 26. SOLVE PROPORTION PROBLEMS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will apply principles of proportion with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Practical Problems in Mathematics	A-1	
	For Electricians.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 96 and 97.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - II. APPLIED MATHEMATICS

TASK - 27. APPLY PRINCIPLES OF REPRESENTATION IN FORMULAS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will apply principles of formulas with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Practical Problems in Mathematics For Electricians.	**A-1**	
		A-2	
R-3		**A-3**	
R-4		**A-4**	
R-5		**A-5**	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 99-101.	**I-1**	Grade test.
P-2	Take test.	**I-2**	
P-3	Go to next task.	**I-3**	
P-4		**I-4**	
P-5		**I-5**	
P-6		**I-6**	
P-7		**I-7**	
P-8		**I-8**	
P-9		**I-9**	
P-10		**I-10**	
P-11		**I-11**	

LESSON PLAN GUIDE

COURSE -	ELECTRICIAN CLUSTER
MODULE -	11. APPLIED MATHEMATICS
TASK -	28. APPLY PRINCIPLE OF REARRANGEMENT IN FORMULAS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will apply principles of rearrangement in formulas with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Practical Problems in Mathematics For Electricians.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 102 and 103.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - II. APPLIED MATHEMATICS

TASK - 29. APPLY PRINCIPLES OF GENERAL SIMPLE FORMULAS.

PERFORMANCE OBJECTIVE -Given reading materials and an assignment, the trainee will apply principles of general simple formulas with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Practical Problems in Mathematics	A-1	
	For Electricians.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 104-112.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - 11. APPLIED MATHEMATICS

TASK - 30. APPLY OHM'S LAW FORMULA.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will apply Ohm's Law formula with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → R-3 → P-3 → P-4 → I-2 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Practical Problems in Mathematics For Electricians.	A-1	"Meter Reading and Ohms Law", 801-3
		A-2	
R-3	Electrical Wiring Fundamentals	A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 113-118.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	Grade test (A-1, 80% accuracy).
P-3	Study R-3, pp. 10-11, 15-16.	I-3	
P-4	Study A-1.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - II. APPLIED MATHEMATICS

TASK - 31. APPLY PRINCIPLES OF POWER FORMULAS.

PERFORMANCE OBJECTIVE - Given reading materials and an assignment, the trainee will apply principles of power formulas with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Practical Problems in Mathematics	A-1	
	For Electricians.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 119 and 120.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - III. BASIC ELECTRICAL INFORMATION

TASK - 32. DIAGRAM AND CONNNECT A SIMPLE SERIES CIRCUIT.

PERFORMANCE OBJECTIVE - Given a reading assignment and after a review of audiovisuals, the trainee will diagram and connect a simple series circuit with 100% accuracy.

PERFORMANCE GUIDE

START ⇒ R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → A-2 → P-4 → P-5 → I-2 → A-4

P-6 → P-7 → I-3 → P-8 → I-4 → P-9 → I-5 → P-10 → ☐ → ☐ → ☐

R **REFERENCE MATERIALS**

R-1 Electrical Wiring Fundamentals.

R-2

R-3

R-4

R-5

A **AUDIO VISUALS**

A-1 "The Electron Theory", 801-1.

A-2 "Circuits, Symbols, and Diagrams", 801-2.

A-4 "Series Circuits", 801-4.

A-5

P **PERFORMANCE ASSIGNMENT**

P-1 Study R-1, pp. 2-10, 15-18.

P-2 Study A-1.

P-3 Complete test.

P-4 Study A-2.

P-5 Complete test.

P-6 Study A-4.

P-7 Complete test.

P-8 Diagram circuit.

P-9 Connect circuit.

P-10 Go to next task.

P-11

I **INSTRUCTOR EVALUATION**

I-1 Grade test (A-1, 80% accuracy).

I-2 Grade test (A-2, 80% accuracy).

I-3 Grade test (A-4, 80% accuracy).

I-4 Check diagram.

I-5 Check circuit.

I-6

I-7

I-8

I-9

I-10

I-11

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - III. BASIC ELECTRICAL INFORMATION

TASK - 33. DIAGRAM AND CONNNECT A SIMPLE PARALLEL CIRCUIT.

PERFORMANCE OBJECTIVE - Given a reading assignment and after a review of audiovisuals, the trainee will diagram and connect a simple parallel circuit with 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → I-3 → P-6

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Parallel Circuits" 801-5.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 19-23.	I-1	Grade test (A-1, 80% accuracy).
P-2	Study A-1.	I-2	Check diagram.
P-3	Take test.	I-3	Check circuit.
P-4	Diagram circuit.	I-4	
P-5	Connect circuit.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - III. BASIC ELECTRICAL INFORMATION

TASK - 34. DIAGRAM AND CONNNECT A COMPLEX CIRCUIT.

PERFORMANCE OBJECTIVE - Given a reading assignment and after a review of an audiovisuals, the trainee will diagram and connect a simple series circuit with 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → I-3 → P-6

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Resistors and Complex Circuits", 801-6.
R-2			
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 23-24.	I-1	Grade test (A-1, 80% accuracy).
P-2	Study A-1.	I-2	Check diagram.
P-3	Take test.	I-3	Check circuit.
P-4	Diagram circuit.	I-4	
P-5	Connect circuit.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - III. BASIC ELECTRICAL INFORMATION

TASK - 35. CONSTRUCT A SIMPLE ELECTROMAGNET.

PERFORMANCE OBJECTIVE - Given a reading assignment, a review of an audiovisual, and the proper tools and materials, the trainee will constuct a simple electromagnet with 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Magnetism and Electromagnetism",
R-2			802-6.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 27-50.	I-1	Grade test (A-1, 80% accuracy).
P-2	Study A-1.	I-2	Check work.
P-3	Take test.	I-3	
P-4	Construct Electromagnet.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - III. BASIC ELECTRICAL INFORMATION

TASK - 36. UNDERSTAND BASIC NEC TERMINOLOGY.

PERFORMANCE OBJECTIVE - Given a reading assignment the trainee will correctly define commonly found terms in the National Electrical Code with 80% accuracy.

PERFORMANCE GUIDE

START →	R-1 →	P-1 →	R-2 →	P-2 →	R-3 →	P-3 →	A-1 →	P-4 →	P-5 →	I-1 →	P-6
	→	→	→	→	→	→	→	→	→	→	

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"National Electric Code and Requirements" 803-1.
R-2	Electrical Wiring Residential.		
R-3	National Electrical Code.	A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 52-59.	I-1	Grade test.
P-2	Study R-2, pp. 3-5.	I-2	
P-3	Study R-3, Article 100.	I-3	
P-4	Study A-1.	I-4	
P-5	Take test (Following page).	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - III. BASIC ELECTRICAL INFORMATION

TASK - 37. IDENTIFY AND KNOW PROPER USE OF COMMONLY USED ELECTRICAL TOOLS AND EQUIPMENT.

PERFORMANCE OBJECTIVE - Given a reading assignment and after a review of audiovisual materials, the trainee will properly identify commonly used electrical tools, and know their safe use and care with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → A-2 → P-4 → P-5 → I-2 → A-3

P-6 → P-7 → I-3 → P-8 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Basic Hand Tools", 819-2.
R-2		A-2	"Cutting Tools", 819-3.
R-3		A-3	"Specialty Tools", 819-4.
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 77-82.	I-1	Grade test (A-1, 80% accuracy).
P-2	Study A-1.	I-2	Grade test (A-2, 80% accuracy).
P-3	Complete test.	I-3	Grade test (A-3, 80% accuracy).
P-4	Study A-2.	I-4	
P-5	Complete test.	I-5	
P-6	Study A-3.	I-6	
P-7	Complete test.	I-7	
P-8	Go to next task.	I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - III. BASIC ELECTRICAL INFORMATION

TASK - 38. MEASURE AC, DC, VOLTAGE, AND OHMS USING THE VOM.

PERFORMANCE OBJECTIVE - Given a typical VOM (multimeter) with AC, S+DC, Ohm scales, test leads, and a circuit requiring measuring, the trainee will use the VOM to correctly measure AC, DC, voltage, and Ohms with 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → A-3 → P-3 → P-4 → P-5 → I-1 → P-6 →

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Alternating Current: What It Is and Where It's Used" 802-1.
R-2	VOM Procedures.		
R-3		A-3	"Alternating Current, Voltage and Power" 802-2.
R-4			
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 68-77.	I-1	Check procedures.
P-2	Study A-1.	I-2	
P-3	Study A-3.	I-3	
P-4	Study R-2 (Following page).	I-4	
P-5	Complete Procedures.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

COURSE: ELECTRICIAN CLUSTER

MODULE: III. BASIC ELECTRICAL OPERATIONS

TASK: 38. MEASURE AC, DC, VOLTAGE AND OHMS USING THE VOM.

PROCEDURES

1. The instructor will identify an existing circuit to be checked and have the student perform testing procedures according to his instructions and under his direct supervision.

2. Have the student identify the proper scale to be used, and set function switch to proper position for test.

3. Measure -

   A. Voltage - Turn power on to energize circuit. Have student position the meter in a safe position for testing and reading meter. Apply test lead probes parallel to energizes circuit and record reading.
   B. Resistance - Make certain power is off on circuit to be tested. Select and identify scale to be used and position selector switch to proper setting to be used. Apply test lead probes to circuit and record ohms reading.

4. Have instructor evaluate work.

5. If satisfactory, go to next task.

COURSE: ELECTRICIAN CLUSTER

MODULE: III. BASIC ELECTRICAL OPERATIONS

TASK: 39. CHECK CONTINUITY AND MEASURE RESISTANCE USING AN OHMMETER.

PROCEDURES

1. The instructor will identify an existing circuit to be checked and have the student perform testing procedures according to his instructions and under his direct supervision.

2. Have the student identify the proper scale to be used, and set function switch to proper position for test.

3. Measure -

   Continuity - Make certain power is off. Have student position meter in a safe position for testing and reading meter. Apply test lead probes to circuit and explain results. Open circuit and repeat.

4. Have instructor evaluate work.

5. If satisfactory, go to next task.

LESSON PLAN GUIDE

COURSE - ELECTRICIAN CLUSTER

MODULE - III. BASIC ELECTRICAL INFORMATION

TASK - 40. USE THE CLAMP-ON AMPMETER.

PERFORMANCE OBJECTIVE - Given an AC circuit to measure, a clamp-on ampmeter or clamp-on ampmeter attachment for a VOM, the trainee will measure a given AC circuit correctly with 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → A-3 → P-3 → R-2 → P-4 → P-5 → I-1 → P-6

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Alternating Current: What It Is and Where It's Used" 802-1.
R-2	Ampmeter Procedures.		
R-3		A-3	"Alternating Current, Voltage and Power" 802-2.
R-4			
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 68-77.	I-1	Check procedures.
P-2	Study A-1.	I-2	
P-3	Study A-3.	I-3	
P-4	Study R-2.	I-4	
P-5	Complete procedure.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

COURSE: ELECTRICIAN CLUSTER

MODULE: III. BASIC ELECTRICAL OPERATIONS

TASK: 40. USE THE CLAMP-ON AMPMETER.

PROCEDURES

1. The instructor will identify an existing circuit to be checked and have the student perform testing procedures according to his instructions and under his direct supervision.

2. Have the student identify the proper scale to be used, and set function switch to proper position for test.

3. Measure -

   Current (AMPS) - The student will open jaws of meter and encircle conductor, release jaws, and note reading. If power pointer on scale does not move, rotate selector switch to next lowest scale until it does indicate a reading.

4. Have instructor evaluate work.

5. If satisfactory, go to next task.

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 41. IDENTIFY COMMONLY USED CONDUIT.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will identify commonly used conduit and the special tools used for conduit work with 80% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 106-122.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 42. CUT AND DEBURR RIGID CONDUIT TO LENGTH USING A HACKSAW AND A PIPE CUTTER.

PERFORMANCE OBJECTIVE -Given an audiovisual presentation, the trainee will cut and deburr rigid conduit to length using a hacksaw and pipecutter in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Cutting" 818-1.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 112 and 113.	I-1	Grade Post-test (A-1, 80% accuracy).
P-2	Study A-1.	I-2	Check task.
P-3	Take test.	I-3	
P-4	Cut and deburr conduit.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 43. CUT A STANDARD LENGTH THREAD ON RIGID CONDUIT USING A DROP-HEAD RATCHET THREADER.

PERFORMANCE OBJECTIVE - Given an audiovisual demonstration, the trainee will cut a standard length on rigid conduit using a drop-head ratchet threader in accordance with local industrial standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1		A-1	"Threading" 818-2.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study A-1.	I-1	Grade Post-test (A-1, 80% accuracy).
P-2	Take Post-test.	I-2	Check task.
P-3	Cut thread.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 44. MAKE BOX OFFSET BENDS IN RIGID CONDUIT USING A HICKEY.

PERFORMANCE OBJECTIVE - Given an audiovisual presentation, the trainee will make box offset bends in rigid conduit using a hickey in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Conduit Bending: Part One" 818-3.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 111	I-1	Grade Post-test (A-1, 80% accuracy).
P-2	Study A-1.	I-2	Check task.
P-3	Take Post-test.	I-3	
P-4	Make bends.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 45. USE IN-THE-AIR TECHNIQUES TO BEND RIGID CONDUIT.

PERFORMANCE OBJECTIVE - Given an audiovisual presentation, the trainee will use on-the-air techniques to bend rigid conduit in accordance with local industrial standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1		A-1	"Conduit Bending: Part One" 818-3.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study A-1.	I-1	Check task.
P-2	Bend conduit.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 46. MAKE A 90 DEGREE BEND IN RIGID CONDUIT.

PERFORMANCE OBJECTIVE - Given an audiovisual demonstration, the trainee will make a 90 degree bend in rigid conduit in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Conduit Bending: Part Two" 818-3.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 109.	I-1	Check task.
P-2	Study A-1.	I-2	
P-3	Bend conduit.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 47. CORRECT AN OVERBEND ON CONDUIT.

PERFORMANCE OBJECTIVE - Given an audiovisual presentation, the trainee will correct an overbend in rigid conduit in accordance with local industrial standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1		A-1	"Conduit Bending: Part One" 818-3.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check task.
P-2	Correct overbend.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 48. MAKE BACK-TO-BACK BENDS IN RIGID CONDUIT.

PERFORMANCE OBJECTIVE - Given an audiovisual demonstration, the trainee will make back-to-back bends in rigid conduit in accordance with local industrial standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1		A-1	"Conduit Bending: Part One" 818-3.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check task.
P-2	Make back-to-back bends.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 49. BEND A 30 DEGREE OFFSET IN RIGID CONDUIT.

PERFORMANCE OBJECTIVE - Given an audiovisual demonstration, the trainee will bend a 30 degree offset in rigid conduit in accordance with local industrial standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1		A-1	"Conduit Bending: Part Two" 818-4.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check task.
P-2	Bend 30 degree offset.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 50. BEND A 45 DEGREE OFFSET TO PASS AN OBSTRUCTION USING RIGID CONDUIT.

PERFORMANCE OBJECTIVE - Given an audiovisual presentation, the trainee will bend a 45 degree offset to pass an obstruction in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Conduit Bending: Part Two" 818-4.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 111-112.	I-1	Check task.
P-2	Study A-1.	I-2	
P-3	Bend 45 degree offset.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 51. MAKE A THREE-BEND SADDLE USING RIGID CONDUIT TO CROSS OVER AN OBSTRUCTION.

PERFORMANCE OBJECTIVE - Given an audiovisual presentation, the trainee will make a three-bend saddle using rigid conduit to cross over an obstruction in accordance with local industrial standards.

PERFORMANCE GUIDE

START →	A-1 →	P-1 →	P-2 →	I-1 →	P-3 →	→	→	→	→	→	
	→	→	→	→	→	→	→	→	→	→	

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1		A-1	"Conduit Bending: Part Two" 818-4.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check task.
P-2	Make three-bend saddle.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 52. INSTALL, SECURE, AND PULL WIRE THROUGH RIGID CONDUIT.

PERFORMANCE OBJECTIVE - Provided with installation requirements, rigid conduit, fasteners, connectors, and the necessary tools and materials, the trainee will install and secure rigid conduit. The conduit and fasteners must be mounted securely in the proper locations, connections must be mechanically secure, and bends must allow for specified conductor fill according to the NEC, Article 346. Wire pulled through the conduit must be intact, with no breaks, and must be long enough for termination in appropriate box as according the NEC, Article 370.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → R-3 → P-3 → P-4 → I-1 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2	National Electrical Code.	A-2	
R-3	Installation procedures.	A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 108-113.	I-1	Check task.
P-2	Study R-2, Article 346.	I-2	
P-3	Study R-3 (Following page).	I-3	
P-4	Complete installation.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

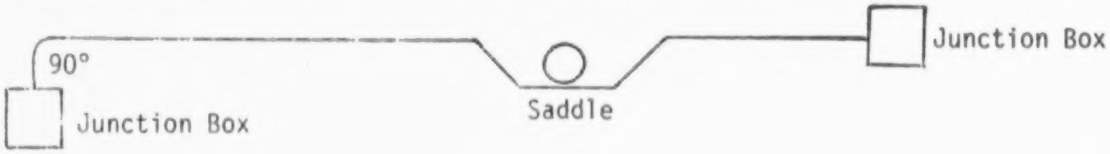
COURSE: ELECTRICIAN CLUSTER

MODULE: IV. CONDUIT OPERATIONS

TASK: 52. INSTALL, SECURE, AND PULL WIRE THROUGH RIGID CONDUIT.

PROCEDURES

The student will diagram, install, and secure rigid conduit given a verbal circuit requirement according to the following specifications:



1. Install and secure conduit and boxes.

2. Insert and push fish tape through conduit.

3. Fasten wire to fish tape and pull wire through conduit.

DO NOT CONNECT WIRES TO THE CIRCUIT!

4. Have instructor evaluate work.

5. If satisfactory, go to next task.

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 53. CUT AND DEBURR THIN-WALL CONDUIT TO LENGTH USING A HACKSAW AND A PIPE CUTTER.

PERFORMANCE OBJECTIVE - Given an audiovisual presentation, the trainee will cut and deburr thin-wall conduit to length using a hacksaw and pipe cutter in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Instructor Demonstration.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Review instructor demonstration.	I-1	Check task.
P-2	Cut and deburr conduit.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 54. MAKE BOX OFFSET BENDS IN THIN-WALL CONDUIT USING AN EMT BENDER.

PERFORMANCE OBJECTIVE - Given an audiovisual presentation, the trainee will make box offset bends in thin-wall conduit using an EMT bender in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Benfield Conduit Bending Manual.	A-1	"The Benfield Bending Technique".
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 9-19.	I-1	Check task.
P-2	Study A-1.	I-2	
P-3	Make box offset bends.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 55. USE IN-THE-AIR TECHNIQUES TO BEND THIN-WALL CONDUIT.

PERFORMANCE OBJECTIVE - Given an audiovisual presentation, the trainee will use on-the-air techniques to bend thin-wall conduit in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Benfield Conduit Bending Manual.	A-1	"The Benfield Bending Technique".
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 19.	I-1	Check task.
P-2	Study A-1.	I-2	
P-3	Bend conduit.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 56. MAKE A 90 DEGREE BEND IN THIN-WALL CONDUIT.

PERFORMANCE OBJECTIVE - Given an audiovisual demonstration, the trainee will make a 90 degree bend in thin-wall conduit in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Benfield Conduit Bending Manual.	A-1	"The Benfield Bending Technique".
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 1-7.	I-1	Check task.
P-2	Study A-1.	I-2	
P-3	Make 90 degree bend.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 57. CORRECT AN OVERBEND IN THIN-WALL CONDUIT.

PERFORMANCE OBJECTIVE - Given an audiovisual presentation, the trainee will correct an overbend in thin-wall conduit in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Benfield Conduit Bending Manual.	A-1	"The Benfield Bending Technique".
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 27.	I-1	Check task.
P-2	Study A-1.	I-2	
P-3	Correct overbend.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 58. MAKE BACK-TO-BACK BENDS IN THIN-WALL CONDUIT.

PERFORMANCE OBJECTIVE - Given an audiovisual demonstration, the trainee will make back-to-back bends in thin-wall conduit in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R REFERENCE MATERIALS

R-1 Benfield Conduit Bending Manual.
R-2
R-3
R-4
R-5

A AUDIO VISUALS

A-1 "The Benfield Bending Technique".
A-2
A-3
A-4
A-5

P PERFORMANCE ASSIGNMENT

P-1 Study R-1, pp. 21-27.
P-2 Study A-1.
P-3 Make back-to-back bends.
P-4 Go to next task.
P-5
P-6
P-7
P-8
P-9
P-10
P-11

I INSTRUCTOR EVALUATION

I-1 Check task.
I-2
I-3
I-4
I-5
I-6
I-7
I-8
I-9
I-10
I-11

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 59. BEND A 30 DEGREE OFFSET IN THIN-WALL CONDUIT.

PERFORMANCE OBJECTIVE - Given an audiovisual demonstration, the trainee will bend a 30 degree offset in thin-wall conduit in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 →

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Benfield Conduit Bending Manual.	A-1	"The Benfield Bending Technique".
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 9-19.	I-1	Check task.
P-2	Study A-1.	I-2	
P-3	Bend 30 degree offset.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 60. BEND A 45 DEGREE OFFSET TO PASS AN OBSTRUCTION USING THIN-WALL CONDUIT.

PERFORMANCE OBJECTIVE - Given an audiovisual presentation, the trainee will bend a 45 degree offset to pass an obstruction in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Benfield Conduit Bending Manual.	A-1	"The Benfield Bending Technique".
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 9-19.	I-1	Check task.
P-2	Study A-1.	I-2	
P-3	Bend 45 degree offset.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 61. MAKE A THREE-BEND SADDLE USING THIN-WALL CONDUIT TO CROSS OVER AN OBSTRUCTION.

PERFORMANCE OBJECTIVE - Given an audiovisual presentation, the trainee will make a three-bend saddle using thin-wall conduit to cross over an obstruction in accordance with local industrial standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Benfield Conduit Bending Manual.	A-1	"The Benfield Bending Technique".
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 33-41.	I-1	Check task.
P-2	Study A-1.	I-2	
P-3	Make three-bend saddle.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 62. INSTALL, SECURE, AND PULL WIRE THROUGH THIN-WALL CONDUIT.

PERFORMANCE OBJECTIVE - Given installation requirements, EMT conduit, fasteners, connectors, and the required tools and materials, the trainee will install, secure, and pull wire through EMT conduit. Conduit and fasteners must be mechanically secure, and bends must allow for required conduit fill according to the NEC, Article 348. Wire pulled through conduit must be intact with no breaks and must be long enough to allow for termination in appropriate boxes according to NEC, Article 370.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → R-3 → P-3 → P-4 → I-1 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2	Electrical Wiring Residential.	A-2	
R-3	Installation procedures.	A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 106-107, 113-114.	I-1	Check task.
P-2	Study R-2, pp. 161-162.	I-2	
P-3	Study R-3 (Following page).	I-3	
P-4	Complete installation.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

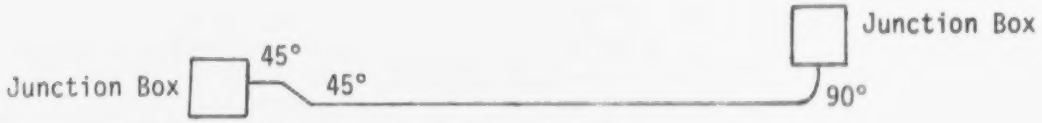
COURSE: ELECTRICIAN CLUSTER

MODULE: IV. CONDUIT OPERATIONS

TASK: 62. INSTALL, SECURE, AND PULL WIRE THROUGH THIN-WALL CONDUIT.

PROCEDURES

The student will diagram, install, and secure rigid conduit given a verbal circuit requirement according to the following specifications:



1. Install and secure conduit and boxes.
2. Insert and push fish tape through conduit.
3. Fasten wire to fish tape and pull wire through conduit.

DO NOT CONNECT WIRES TO THE CIRCUIT!

4. Have instructor evaluate work.
5. If satisfactory, go to next task.

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 63. INSTALL AND SECURE PVC PLASTIC CONDUIT.

PERFORMANCE OBJECTIVE - Provided with instruction on handling PVC conduit, installation requirements, PVC conduit, fitting, glue, fasteners, connectors, and the necessary materials and tools, the trainee will install and secure PVC plastic conduit. The conduit and fasteners must be mounted securely in proper locations, connections must be mechanically secure and bends must allow conductors to be used. Installation must be according to the NEC, Article 347.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → R-3 → P-3 → P-4 → I-1 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2	National Electrical Code.	A-2	
R-3	Installation procedures.	A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 116.	I-1	Check task.
P-2	Study R-2, Article 347.	I-2	
P-3	Study R-3 (Following page).	I-3	
P-4	Complete installation.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

COURSE: ELECTRICIAN CLUSTER

MODULE: IV. CONDUIT OPERATIONS

TASK: 63. INSTALL AND SECURE PVC PLASTIC CONDUIT.

PROCEDURES

The student will diagram, install, and secure rigid conduit given a verbal circuit requirement according to the following specifications:

> Use drawing found in (R-1), Electrical Wiring Fundamentals, Figure 7-34 (p. 120) as a guide for the type and number of bends to make.

1. Install and secure conduit and boxes.
2. Insert and push fish tape through conduit.
3. Fasten wire to fish tape and pull wire through conduit.

DO NOT CONNECT WIRES TO THE CIRCUIT!

4. Have instructor evaluate work.
5. If satisfactory, go to next task.

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 64. INSTALL AND SECURE FLEXIBLE CONDUIT.

PERFORMANCE OBJECTIVE - Given conduit, fasteners, connectors, and the required tools and materials, the trainee will install and secure flexible conduit. Flexible conduit and fasteners must be mounted securely in proper locations, connections must be mechanically secure, and bends must allow conductors to be used according to the NEC, Article 350.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → R-3 → P-3 → P-4 → I-1 → P-5

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2	Electrical Wiring Residential.	A-2	
R-3	Installation procedures.	A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 107, 115-116.	I-1	Check task.
P-2	Study R-2, pp. 52-54.	I-2	
P-3	Study R-3 (Following page).	I-3	
P-4	Install conduit.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

COURSE: ELECTRICIAN CLUSTER

MODULE: IV. CONDUIT OPERATIONS

TASK: 64. INSTALL AND SECURE FLEXIBLE CONDUIT.

PROCEDURES

The student will diagram, install, and secure rigid conduit given a verbal circuit requirement according to the following specifications:

> Use drawing found in (R-1), Electrical Wiring Fundamentals, Figure 7-34 (p. 120) as a guide for the type and number of bends to make.

1. Install and secure conduit and boxes.

2. Insert and push fish tape through conduit.

3. Fasten wire to fish tape and pull wire through conduit.

DO NOT CONNECT WIRES TO THE CIRCUIT!

4. Have instructor evaluate work.

5. If satisfactory, go to next task.

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - IV. CONDUIT OPERATIONS

TASK - 65. INSTALL AND SECURE LIQUID TIGHT FLEXIBLE CONDUIT.

PERFORMANCE OBJECTIVE - Given a diagram and the proper tools and materials, the trainee will install and secure liquid tight flexible conduit from a safety switch to an inside junction box according to the NEC, Article 351.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Residential.	A-1	
R-2	Installation Procedures.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 52-55.	I-1	Check task.
P-2	Study R-2 (Following page).	I-2	
P-3	Install circuit.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

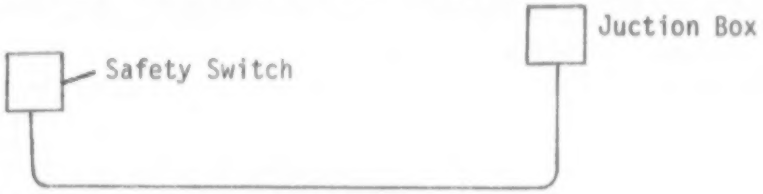
COURSE: ELECTRICIAN CLUSTER

MODULE: IV. CONDUIT OPERATIONS

TASK: 65. INSTALL AND SECURE LIQUID TIGHT FLEXIBLE CONDUIT.

PROCEDURES

The student will diagram, install, and secure rigid conduit given a verbal circuit requirement according to the following specifications:



1. Install and secure conduit and boxes.
2. Insert and push fish tape through conduit.
3. Fasten wire to fish tape and pull wire through conduit.

DO NOT CONNECT WIRES TO THE CIRCUIT!

4. Have instructor evaluate work.
5. If satisfactory, go to next task.

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 66. IDENTIFY COMMONLY USED WIRE AND CABLE.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will properly identify the different kinds of wire and cable commonly used in industry with 80% accuracy.

PERFORMANCE GUIDE

START → A-1 → P-1 → A-2 → P-2 → R-2 → P-3 → R-1 → P-4 → P-5 → I-1 → P-6

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Estimating The Job", 804-1.
R-2	Electrical Wiring: Residential.	A-2	"Planning The Job", 804-2.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test (R-2, 80% accuracy).
P-2	Study A-2.	I-2	
P-3	Study R-2, pp. 85-104.	I-3	
P-4	Study R-1, pp. 37-58.	I-4	
P-5	Take test.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 67. IDENTIFY COMMONLY USED ELECTRICAL BOXES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand installation procedures for various electrical boxes with 80% accuracy.

PERFORMANCE GUIDE

START ⇒ R-1 → P-1 → R-2 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	A	**AUDIO VISUALS**
R-1	Electrical Wiring Fundamentals.	A-1	
R-2	Electrical Wiring: Residential.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	I	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 124-139.	I-1	Grade test (R-2, 80% accuracy).
P-2	Study R-2, pp. 10-18.	I-2	
P-3	Take test.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 68. MOUNT ELECTRICAL OUTLET TO STUD.

PERFORMANCE OBJECTIVE - Given tool pouch, 6' rule, hammer and nails or screw driver and screws, 2" x 4" outlet box, the trainee will flush mount the outlet box to 2" x 4" studs. The installation must meet the requirements as specified by the National Electric Code.

PERFORMANCE GUIDE

START → A-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1		A-1	"Electrical Wiring Techniques" 803-2.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check task.
P-2	Mount box to stud.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 69. INSTALL (BAR-HANGER) MOUNTED BOX.

PERFORMANCE OBJECTIVE - Given box and basic tools, install (bar-hanger) mounted box. Box must be securely mounted to be flush with the finished ceiling and be located according to plans. The installation of the bar-hanger mounted box must meet the requirements as specified by the National Electrical Code.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Electrical Wiring Fundamentals.	A-1	"Receptacles and Ground Fault
R-2	Electrical Wiring: Residential.		Interrupters" 803-3.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 131-132.	I-1	Check task.
P-2	Study R-2, p. 11.	I-2	
P-3	Install box.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 70. INSTALL SURFACE MOUNT SWITCH OR OUTLET BOX ON A MASONRY WALL. (OPTIONAL)

PERFORMANCE OBJECTIVE - Given box, basic tools, and installation/electrical materials, install surface mount switch or outlet box on a masonry wall. The installation of the boxes must meet the requirements as specified by the National Electrical Code.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 119.	I-1	Check task.
P-2	Install switch or box.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 71. INSTALL GANGABLE BOXES.

PERFORMANCE OBJECTIVE - Given gangable boxes, basic tools, and installation/electrical materials, install gangable boxes. Gangable boxes must be of required size and type. Boxes must be fastened securely to the structure and be level across the top. The installation of the boxes must meet the requirements as specified by the National Electrical Code.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2	Electrical Wiring: Residential.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 127-128.	I-1	Check task.
P-2	Study R-2, p. 14.	I-2	
P-3	Install gangable boxes.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 72. INSTALL RECESSED FIXTURE HOUSING IN CEILING.

PERFORMANCE OBJECTIVE - Given recessed fixture box, basic tools, and installation/electrical materials, install recessed fixture box in ceiling. The installation of the recess fixture housing must meet the requirements as specified by the National Electrical Code.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Installing Recessed Fixtures",
R-2			804-5.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check task.
P-2	Study R-1, pp. 98-99.	I-2	
P-3	Install fixture housing.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 73. MAKE SPLICES USING MECHANICAL-TYPE CONNECTORS (SPLIT-BOLT CONNECTORS, LUGS, AND WIRE NUTS).

PERFORMANCE OBJECTIVE - Given the basic tool kit and installation/electrical materials, make splices using mechanical-type connectors (make a pig-tail splice using a wire nut and make a t-splice using a split-bolt connector). The splices must be insulated to withstand applied voltage. The splices must meet the requirements as oulined by the National Electrical Code.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2	Electrical Wiring: Residential.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 39-40.	I-1	Check task.
P-2	Study R-2, pp. 94-103.	I-2	
P-3	Make splices.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 74. SOLDER AND TAPE A PIGTAIL AND T-SPLICE JOINT.

PERFORMANCE OBJECTIVE - Given basic tools, soldering iron or gun, solid wire, and necessary materials, the trainee will solder and tape a pigtail and T-splice joint as specified by the National Electrical Code.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 101-102.	I-1	Check task.
P-2	Solder pigtail and T-splice.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 75. IDENTIFY PROPER USES OF SWITCHES, RECEPTACLES, AND FIXTURES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand the proper uses of different types of switches, receptacles and fixtures most commonly used in industry with 80% accuracy.

PERFORMANCE GUIDE

START → A-1 → P-1 → A-3 → P-2 → A-4 → P-3 → R-1 → P-4 → P-5 → I-1 → P-6

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Receptacles and Ground Fault Interrupters" 803-3.
R-2			
R-3		A-3	"Switch Control", 803-4.
R-4		A-4	"Three-way and Four-way Switches", 803-5.
R-5			

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test (R-1, 80% accuracy).
P-2	Study A-3.	I-2	
P-3	Study A-4.	I-3	
P-4	Study R-1, pp. 141-162.	I-4	
P-5	Take test.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 76. IDENTIFY AND INTERPRET ELECTRICAL SYMBOLS AND DIAGRAMS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will identify commonly used electrical symbols and outlets used in residential wiring with 80% accuracy.

PERFORMANCE GUIDE

START → A-1 → P-1 → A-3 → P-2 → R-1 → P-3 → P-4 → I-1 → R-2 → P-5 → P-6

I-2 → P-7 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"National Electrical Code and Requirements" 803-1.
R-2	Electrical Wiring Fundamentals.		
R-3		A-3	"Circuits, Symbols and Diagrams", 801-2.
R-4			
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test (R-1, 80% accuracy).
P-2	Study A-3.	I-2	Grade test (R-2, 80% accuracy).
P-3	Study R-1, pp. 8-24.	I-3	
P-4	Take test.	I-4	
P-5	Study R-2, pp. 198-205.	I-5	
P-6	Take test.	I-6	
P-7	Go to next task.	I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 77. DIAGRAM AND INSTALL A SINGLE 115V DUPLEX RECPTACLE.

PERFORMANCE OBJECTIVE - Given a tool pouch, electric drill with 1/2" wood bit, wire stripper, screws, 6' rule, #12/2 WG wire, duplex receptacle with cover, tape and wire nuts, romex staples and an NEC book, the trainee will install a 115V duplex receptacle as specified by National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → R-2 → P-3 → P-4 → I-1 → P-5 → I-2 → P-6

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Receptacle and Ground Fault Interrupters" 803-3.
R-2	Electrical Wiring: Residential.		
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check diagram.
P-2	Study R-1, pp. 145-146.	I-2	Check task.
P-3	Study R-2, pp. 184-185.	I-3	
P-4	Complete diagram.	I-4	
P-5	Install duplex receptacle.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 78. DIAGRAM AND INSTALL SPLIT CIRCUIT WIRING FOR A SWITCHED DUPLEX RECEPTACLE.

PERFORMANCE OBJECTIVE - Given appropriate tools, materials, and supplies, the trainee will diagram and install split circuit wiring for a switched duplex receptacle as specified by National Electrical Code standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Receptacles and Ground Fault
R-2			Interrupters" 803-3.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1.	I-1	Check diagram.
P-2	Study A-1.	I-2	Check task.
P-3	Complete diagram.	I-3	
P-4	Install wiring.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 79. DIAGRAM AND INSTALL A GROUND-FAULT INTERRUPTER DUPLEX RECEPTACLE.

PERFORMANCE OBJECTIVE - Given appropriate tools, materials, and supplies, the trainee will diagram and install a ground-fault interrupter receptacle as specified by National Electrical Code standards.

PERFORMANCE GUIDE

START →	A-1 →	P-1 →	R-1 →	P-2 →	P-3 →	I-1 →	P-4 →	I-2 →	P-5 →	→	
	→	→	→	→	→	→	→	→	→	→	

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Receptacles and Ground Fault Interrupters" 803-3.
R-2			
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check diagram.
P-2	Study R-1, pp. 75-78.	I-2	Check task.
P-3	Diagram task.	I-3	
P-4	Install GFI receptacle.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 80. DIAGRAM AND INSTALL A KEYLESS PORCELAIN LAMPHOLDER WITH SINGLE-POLE SWITCH.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, electric drill with 1/2" wood bits, #12/2 WG wire nonmetallic sheath cable, keyless porcelain lampholder with single-pole switch, 2"x 4" outlet box, tape, and wire nuts, the trainee will diagram for instructor approval, then install the lampholder. The lampholder will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → R-2 → P-3 → P-4 → I-1 → P-5 → I-2 → P-6

R	**REFERENCE MATERIALS**	A	**AUDIO VISUALS**
R-1	Electrical Wiring: Residential.	A-1	"Switch Control", 804-3.
R-2	Electrical Wiring Fundamentals.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	I	**INSTRUCTOR EVALUATION**
P-1	Study A-1.	I-1	Check diagram.
P-2	Study R-1, pp. 61, Fig. 5-4, 5-5.	I-2	Check task.
P-3	Study R-2, p. 152.	I-3	
P-4	Complete diagram.	I-4	
P-5	Install lampholder.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 81. DIAGRAM AND INSTALL SIX KEYLESS PORCELAIN LAMPHOLDERS TO BE CONNECTED IN SERIES.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, electric drill with 1/2" wood bit, #12/2 WG wire, six keyless porcelain lampholders with six octagon boxes, one single-pole switch with cover, one 2"x4" outlet box, tape, wire nuts, and an NEC book, the trainee will install and wire six porcelain lampholders in series, after gaining instructor approval of diagram. The six lampholders will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → A-2 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1		A-1	"Series Circuits" 801-4.
R-2		A-2	"Switch Control" 803-4.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check diagram.
P-2	Study A-2.	I-2	Check task.
P-3	Complete diagram.	I-3	
P-4	Install lampholders.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 82. DIAGRAM AND INSTALL SIX KEYLESS PORCELAIN LAMPHOLDERS TO BE CONNECTED IN PARALLEL AND CONTROLLED BY DIMMER SWITCH.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, electric drill with 1/2" wood bits, #12/2 WG wire, six keyless porcelain lampholders with six octagon boxes, one single-pole switch with cover, one 2x4" outlet box, tape, wire nuts, NEC book, and one dimmer switch, the trainee will install and wire six porcelain lampholders in parallel, after gaining instructor approval of diagram. The six lampholders will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → A-2 → P-2 → R-1 → P-3 → P-5 → P-6 → I-1 → P-7 → I-2

P-8 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Parallel Circuits" 801-5.
R-2		A-2	"Switch Control" 803-4.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check diagram.
P-2	Study A-2.	I-2	Check task.
P-3	Study R-1, Pp. 139-140, Fig. 11-8,	I-3	
	11-9, 11-10.	I-4	
P-5	Study A-1.	I-5	
P-6	Complete diagram.	I-6	
P-7	Install lampholders.	I-7	
P-8	Go to next task.	I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 83. DIAGRAM AND INSTALL A LAMP FIXTURE WITH TWO THREE-WAY SWITCHES.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, electric drill with 1/2" wood bits, #12/3 WG wire non-metallic sheath cable lamp fixture, one octagon box, 2 two-way switches with covers, two outlet boxes, tape, and wire nuts, the trainee will diagram for instructor approval, then install lamp fixture with two three-way switches. The fixture will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → A-3 → P-2 → R-1 → P-3 → P-4 → I-1 → P-5 → I-2 → P-6

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Three-way and Four-way Switches"
R-2			803-5.
R-3		A-3	"Hanging The Fixtures and Setting
R-4			The Receptacles" 804-10.
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check diagram.
P-2	Study A-3.	I-2	Check task.
P-3	Study R-1, pp. 61-64.	I-3	
P-4	Complete diagram.	I-4	
P-5	Install lamp fixture.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 84. DIAGRAM AND INSTALL A LAMP FIXTURE WITH TWO THREE-WAY SWITCHES AND A FOUR-WAY SWITCH TO BE CONTROLLED FROM THREE LOCATIONS.

PERFORMANCE OBJECTIVE Given a tool pouch, 6' rule, electric drill with 1/2" wood bits, #12/3 WG wire non-metallic sheath cable, lamp fixture, one octagon box, 2 three-way switches with covers, 1 four-way switch with cover, three outlet boxes with covers, tape, and wire nuts, the trainee will diagram for instructor approval, then install lamp fixture with two three-way switches and one four-way switch to be controlled from three locations. The fixture will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Three-Way and Four-Way Switches"
R-2			803-5.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 64-65.	I-1	Check diagram.
P-2	Study A-1.	I-2	Check task.
P-3	Complete diagram.	I-3	
P-4	Install lamp fixture.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 85. DIAGRAM AND INSTALL SIX DUPLEX RECEPTACLES WITH A THREE-WIRE SPLIT CIRCUIT.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, claw hammer and nails, voltmeter, #12/3 WG wire, six duplex receptacles with cover, six 2x4" outlet boxes, and an NEC book, the trainee will install and wire six duplex receptacles with a three-wire split circuit, after gaining instructor approval of diagram. The receptacles will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 126-127.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Install receptacle.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 86. DIAGRAM AND INSTALL TWO TWO-TUBE FLUORESCENT LAMP FIXTURES USING AN OCTAGON OUTLET BOX WITH BRACKET TO BE CONTROLLED FROM TWO LOCATIONS.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, electric drill with 1/2" wood bit, wire stripper, screws, #12/2 and #12/3 WG wire, two two-tube fluorescent fixtures, two 3-way switches with covers, four 2"x4" outlet boxes, tape, wire nuts, and an NEC book, the trainee will install and wire the two two-tube fluorescent lamp fixtures together, after gaining instructor approval of diagram. The fluorescent lamps will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Three-Way and Four-Way Switches"
R-2			803-5.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check diagram.
P-2	Study R-1, pp. 61-64.	I-2	Check task.
P-3	Complete diagram.	I-3	
P-4	Install lamp fixture.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 87. DIAGRAM AND INSTALL A PADDLE FAN.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, electric drill with 1/2" wood bits, 4" octagon outlet box with cover, a three-speed 120V paddle fan, and an NEC book, the trainee will install and wire a paddle fan, after gaining instructor approval of diagram. The paddle fan installation will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 88-90.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Install paddle fan.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 88. DIAGRAM AND INSTALL A LOW VOLTAGE TRANSFORMER FOR DOOR BELL (CHIME) WITH TWO PUSH BUTTON SWITCHES.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, electric drill with 1/2" wood bits, low voltage wire (18-22 gage), one transformer, one bell (chime), two push buttons, 4" octagon outlet box with cover, tape, wire nuts, and an NEC book, the trainee will install and wire the door bell (chime), after gaining instructor approval of diagram. The bell (chime) will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → A-2 → P-2 → R-1 → P-3 → R-2 → P-4 → P-5 → I-1 → P-6

I-2 → P-7 → I-3 → P-8 → → → → → → →

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Transformers" 802-8
R-2	Electrical Wiring Fundamentals.	A-2	"Installation For Signal Systems"
R-3			804-11.
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test (R-2, 80% accuracy).
P-2	Study A-2.	I-2	Check diagram.
P-3	Study R-1, pp. 243-246.	I-3	Check task.
P-4	Study R-2, pp. 262-277.	I-4	
P-5	Take test.	I-5	
P-6	Complete diagram.	I-6	
P-7	Install transformer.	I-7	
P-8	Go to next task.	I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 89. DIAGRAM AND INSTALL A LOW VOLTAGE INTERCOM SYSTEM.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, electric drill with 1/2" wood bits, low voltage wire (18-22 gage), a transformer, master unit with speakers, housing, tape, wire nuts, and an NEC book, the trainee will install and wire an intercom system, according to manufacturer's specifications, after gaining instructor approval of diagram. The system will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Manufacturer's Specifications	A-1	
	e.g. "Nutone Radio Intercom System".	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Install intercom.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 90. DIAGRAM AND INSTALL TELEPHONE/TELEVISION SIGNAL SYSTEMS.

PERFORMANCE OBJECTIVE - Given appropriate tools, materials, and supplies, the trainee will diagram and install jacks and wiring for telephone and antenna to meet National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → I-3 → P-6

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Electrical Wiring: Residential.	A-1	"Installation For Telephone, T.V."
R-2			804-12.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study A-1.	I-1	Grade test (R-1, 80% accuracy).
P-2	Study R-1, pp. 232-249.	I-2	Check diagram.
P-3	Take test.	I-3	Check task.
P-4	Complete diagram.	I-4	
P-5	Install signal system.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 91. MAKE AN EXTENSION CORD USING MALE AND FEMALE CAPS.

PERFORMANCE OBJECTIVE - Given appropriate tools, materials, and supplies, the trainee will make an extension cord using male and female caps to meet National Electrical Code standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	National Electrician Code.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, Article 240-4,	I-1	Check task.
	Article 305-6 (b).	I-2	
P-3	Make extension cord.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 92. DIAGRAM AND INSTALL SPECIAL PURPOSE 220V OUTLET FOR RANGE.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, electric drill with 1/2" wood bits, appropriate wire, range power receptacle (50 amp, 125/150V-surface mount), tape, wire nuts, and an NEC book, the trainee will install and wire outlet for range, after gaining instructor approval of diagram. The outlet will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Special Purpose Outlets" 804-7.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check diagram.
P-2	Study R-1, p. 202.	I-2	Check task.
P-3	Complete diagram.	I-3	
P-4	Install range outlet.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 93. DIAGRAM AND INSTALL SPECIAL PURPOSE 220V OUTLET FOR WINDOW AIR CONDITIONER.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, electric drill with 1/2" wood bits, appropriate wire, special purpose 220V outlet with box and cover, tape, wire nuts, and an NEC book, the trainee will install and wire special purpose 220V outlet for window air conditioner, after gaining instructor approval of diagram. The outlet will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Special Purpose Outlets" 804-7.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check diagram.
P-2	Study R-1, pp. 255-257.	I-2	Check task.
P-3	Complete diagram.	I-3	
P-4	Install AC outlet.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 94. DIAGRAM AND INSTALL A WATER HEATER WITH A 24 HOUR TIMER.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, electric drill with 1/4" wood bits, appropriate wire, tape, wire nuts, and an NEC book, the trainee will diagram and install a 220V/240V water heater with a 24 hour timer, after gaining instructor approval of diagram. The water heater will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-4 → I-2 → P-5 → I-3 → P-6

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 190-195.	I-1	Grade test (R-1 80% accuracy).
P-2	Complete Water Heater Circuit test, pp. 196-197.	I-2	Check diagram.
		I-3	Check task.
P-4	Complete diagram.	I-4	
P-5	Install water heater.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 95. CALCULATE AND LIST GROUP LOADS FOR A SERVICE ENTRANCE.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to calculate and list group loads for a service entrance in accordance with National Electrical Code standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → P-3 → I-1 → P-4 → P-5 → I-2 → P-6 → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	~~Electrical Wiring: Residential.~~	A-1	
R-2	~~Electrical Wiring Fundamentals.~~	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 25-30.	I-1	Grade test (R-2 80% accuracy).
P-2	Study R-2, pp. 187-194.	I-2	Grade test (R-1 80% accuracy).
P-3	Take test.	I-3	
P-4	Study R-1, pp. 310-315.	I-4	
P-5	Take test.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 96. INSTALL A SERVICE ENTRANCE, 120V-240V, SINGLE PHASE, WITH DISTRIBUTION PANEL.

PERFORMANCE OBJECTIVE -Given a tool pouch, threader and dies, hack saw, electric drill with 1/2" wood bits, level, wood chisel, hammer, plumb bob, 2" conduit, 1/0 TW stranded wire, 2" threaded cap (weatherhead), meter base, 30amp 2pole 220V disconnect, tape, wire nuts, 2" straps, ground rod and clamps, and 1/2"-3/4" conduit and fittings, the trainee will diagram for instructor approval, then install and wire a service entrance with distribution panel according to NEC standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → R-2 → P-3 → P-4 → I-1 → P-5 → I-2 → P-6

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Underground Service Entrance"
R-2	Electrical Wiring: Residential.		804-3.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test.
P-2	Study R-1, pp. 182-187.	I-2	Check task.
P-3	Study R-2, pp. 107, Fig. 9-2, 283-309.	I-3	
P-4	Take test.	I-4	
P-5	Install service entrance.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 97. DIAGRAM AND INSTALL BRANCH CIRCUITS FROM DISTRIBUTION PANEL TO LIGHTS AND RECEPTACLE OUTLETS.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, electric drill with 1/2" wood bits, #12/2 and #12/2 WG wire, staples, tape, wire nuts, and an NEC book, the trainee will install branch circuits from distribution panel to lights and receptacle outlets to meet National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Fuse and Circuit Breaker Panels"
R-2			803-6.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check diagram.
P-2	Study R-1, p. 73, Fig. 6-4.	I-2	Check task.
P-3	Complete diagram.	I-3	
P-4	Install branch circuits.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 98. DIAGRAM AND INSTALL A 220V, SINGLE-PHASE 60 AMP DISCONNECT IN CONDUIT FROM MAIN PANEL TO DISCONNECT.

PERFORMANCE OBJECTIVE - Given a tool pouch, 6' rule, level, #6 TW wire, 3/4" rigid conduit, 220V, single-phase 60 amp disconnect, fuses, screws, lock nuts, bushings, straps, and an NEC book, the trainee will install and wire disconnect, after gaining instructor approval of diagram. The disconnect will meet National Electrical Code standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → P-4 → I-1 → P-5 → I-2 → P-6 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2	Electrical Wiring: Residential.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 182.	I-1	Check diagram.
P-2	Study R-2, pp. 51-52, 158-159,	I-2	Check task.
	161-162.	I-3	
P-4	Complete diagram.	I-4	
P-5	Install disconnect.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 99. TEST CIRCUITS AND INSTALL CIRCUIT BREAKERS IN DISTRIBUTION PANEL. MARK ALL CIRCUITS IN MAIN PANEL.

PERFORMANCE OBJECTIVE - Given a tool pouch, volt/ohm meter, clamp-on-amprobe, appropriate circuit breakers, tape, appropriate numbers and letters, and an NEC book, the trainee will test all circuits and properly identify circuit breakers to meet National Electrical Code standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → A-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Fuse and Circuit Breaker Panels"
R-2			803-6.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 107, Fig. 9-2.	I-1	Check test (A-1, 80% accuracy).
P-2	Study A-1.	I-2	Check task.
P-3	Complete test.	I-3	
P-4	Test circuits.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 100. CONNECT ALL CIRCUITS IN MAIN PANEL.

PERFORMANCE OBJECTIVE - Given a tool pouch and an NEC book, the trainee will connect all circuits in main panel to meet National Electrical Code standards.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → A-1 → P-3 → A-3 → P-4 → P-5 → I-1 → P-6

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	"Fuse and Circuit Breaker Panels"
R-2	Electrical Wiring: Residential.		803-6
R-3		A-3	"Underground Service Entrance"
R-4			804-3.
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 188, Fig. 11-16.	I-1	Check task.
P-2	Study R-2, pp. 107, Fig. 9-2.	I-2	
P-3	Study A-1.	I-3	
P-4	Study A-3.	I-4	
P-5	Connect all circuits.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 101. TEST ALL CIRCUITS FOR GROUNDS WITH OHMMETER AND TURN ON BREAKER TO ENERGIZE CIRCUITS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will accurately test all circuits for grounds with an ohmmeter and turn on breaker to energize circuits.

NOTE: INSTRUCTOR MUST APPROVE WORK AND BE PRESENT WHEN CIRCUITS ARE ENERGIZED.*

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 230-242.	I-1	Check test.
P-2	Take test.	I-2	Check task.
P-3	Complete task.*	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 102. TROUBLESHOOT AND REPLACE EXISTING CIRCUIT BREAKERS.

PERFORMANCE OBJECTIVE - Given a VOM, the trainee will check for proper voltage of all circuit breakers in an existing panel and replace if necessary.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 164-174.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	Check task.
P-3	Troubleshoot breaker.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

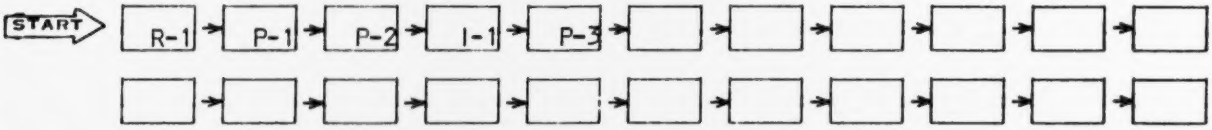
COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 103. TROUBLESHOOT AND REPLACE EXISTING FUSES.

PERFORMANCE OBJECTIVE - Given a VOM, the trainee will check for proper voltage and continuity of fuses in an existing panel and replace if necessary.

PERFORMANCE GUIDE



R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 166-169.	I-1	Check task.
P-2	Troubleshoot fuses.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

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TASK - 104. TROUBLESHOOT AND REPLACE EXISTING RECEPTACLES.

PERFORMANCE OBJECTIVE - Given a VOM, the trainee will test 120V duplex receptacles for proper voltage and replace if necessary.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 145-152.	I-1	Check task.
P-2	Troubleshoot receptacles.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

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TASK - 105. TROUBLESHOOT AND REPLACE EXISTING SWITCHES.

PERFORMANCE OBJECTIVE - Given a VOM, the trainee will test 120V single-pole, three-way, and four-way switches for proper operation and replace if necessary.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-2 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2	Electrical Wiring: Residential.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 141-145.	I-1	Check task.
P-2	Study R-2, pp. 62-64.	I-2	
P-3	Troubleshoot switches.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 106. TROUBLESHOOT AND REPLACE EXISTING FLOURESCENT BALLAST.

PERFORMANCE OBJECTIVE - Given a VOM, the trainee will check for 120V to ballast and replace if necessary.

PERFORMANCE GUIDE

1

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring Fundamentals.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 240-241.	I-1	Check task.
P-2	Troubleshoot ballast.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

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TASK - 107. TROUBLESHOOT AND REPLACE EXISTING FLOURESCENT TUBES AND TUBE HOLDERS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will visually inspect tube pins and lampholders for wear and damage and correct as necessary: replace tube, straighten pin, replace holder.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Electrical Wiring Fundamentals.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 240-241.	I-1	Check task.
P-2	Troubleshoot tubes and tube holders.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 108. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A BEDROOM.

PERFORMANCE OBJECTIVE - Given the necessary electrical tools, materials, and supplies, the trainee will diagram and wire a branch circuit for a bedroom as specified by NEC standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → I-2 → P-4 → I-3 → P-5 →

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Roughing-In The Wiring" 804-4.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test (R-1 80% accuracy).
P-2	Study R-1, pp. 68-80.	I-2	Check diagram (R-1, 100% accuracy).
P-3	Take test.	I-3	Check task.
P-4	Wire bedroom branch circuit.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 109. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A BATHROOM AND PASSAGE.

PERFORMANCE OBJECTIVE - Given the necessary electrical tools, materials, and supplies, the trainee will diagram and wire a branch circuit for a bathroom and passage as specified by NEC standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → A-3 → P-2 → R-1 → P-3 → P-4 → I-1 → I-2 → P-5 → I-3

P-6 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Installing Bathroom Ceiling Light and Exhaust Fan" 804-6.
R-2			
R-3		A-3	"Receptacles and Ground Fault Interrupters" 803-3.
R-4			
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test (R-1, 80% accuracy).
P-2	Study A-3.	I-2	Check diagram (R-1, 100% accuracy).
P-3	Study R-1, pp. 93-102.	I-3	Check task.
P-4	Take test.	I-4	
P-5	Wire bathroom and passage.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 110. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A HALL AND FRONT ENTRANCE.

PERFORMANCE OBJECTIVE - Given the necessary electrical tools, materials, and supplies, the trainee will diagram and wire a branch circuit for a hall and front entrance as specified by NEC standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → A-2 → P-2 → A-3 → P-3 → R-1 → P-4 → P-5 → I-1 → I-2

P-6 → I-3 → P-7 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R REFERENCE MATERIALS

R-1 Electrical Wiring: Residential.
R-2
R-3
R-4
R-5

A AUDIO VISUALS

A-1 "Switch Control" 803-4.
A-2 "Outdoor Lighting-Part One" 804-15.
A-3 "Outdoor Lighting-Part Two" 804-16.
A-4
A-5

P PERFORMANCE ASSIGNMENT

P-1 Study A-1.
P-2 Study A-2.
P-3 Study A-3.
P-4 Study R-1, pp. 106-119.
P-5 Take test.
P-6 Wire hall and front entrance.
P-7 Go to next task.
P-8
P-9
P-10
P-11

I INSTRUCTOR EVALUATION

I-1 Grade test (R-1, 80% accuracy).
I-2 Check diagram (R-1, 100% accuracy).
I-3 Check task.
I-4
I-5
I-6
I-7
I-8
I-9
I-10
I-11

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 111. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A KITCHEN AND REAR ENTRY AND APPLIANCE CIRCUITS FOR KITCHEN.

PERFORMANCE OBJECTIVE - Given the necessary electrical tools, materials, and supplies, the trainee will diagram and wire a branch circuit for kitchen and rear entry and small appliance circuits for kitchen as specified by NEC standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → I-2 → P-4 → I-3 → I-4 → P-5

I-5 → P-6 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Small Appliance Circuits" 804-8.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test (R-1 80% accuracy).
P-2	Study R-1, pp. 120-129.	I-2	Check diagram (100%, question 20).
P-3	Take test.	I-3	Check task.
P-4	Wire kitchen and rear entry.	I-4	Check diagram (100%, question 28).
P-5	Wire appliance circuits.	I-5	Check task.
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 112. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A LIVING ROOM.

PERFORMANCE OBJECTIVE - Given the necessary electrical tools, materials, and supplies, the trainee will diagram and wire a branch circuit for a living room as specified by NEC standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → I-2 → P-4 → I-3 → P-5

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Three-way and Four-way Switches"
R-2			803-5.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test (R-1 80% accuracy).
P-2	Study R-1, pp. 134-142.	I-2	Check diagram (100%, question 26).
P-3	Take test.	I-3	Check task.
P-4	Wire living room circuit.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 113. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR THE DINING AREAS, PORCH, GARAGE, STORAGE AREA, AND ATTIC.

PERFORMANCE OBJECTIVE - Given the necessary electrical tools, materials, and supplies, the trainee will diagram and wire a branch circuit for the dining area, porch, garage, storage area, and attic as specified by NEC standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → A-3 → P-2 → R-1 → P-3 → P-4 → I-1 → I-2 → P-5 → I-3

P-6 → → → → → → → → → →

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Receptacles and Ground Fault Interrupters" 803-3.
R-2			
R-3		A-3	"Three-way and Four-way Switches" 803-5.
R-4			
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test (R-1 80% accuracy).
P-2	Study A-3.	I-2	Check diagram (100%, question 22).
P-3	Study R-1, pp. 146-153.	I-3	Check task.
P-4	Take test.	I-4	
P-5	Wire branch circuit.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 114. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A GARAGE.

PERFORMANCE OBJECTIVE - Given the necessary electrical tools, materials, and supplies, the trainee will diagram and wire a branch circuit for a garage as specified by NEC standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → A-3 → P-2 → R-1 → P-3 → P-4 → I-1 → I-2 → P-5 → I-3

P-6 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Receptacles and Ground Fault
R-2			Interrupters" 803-3.
R-3		A-3	"Three-way and Four-way Switches"
R-4			803-5.
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test (R-1 80% accuracy).
P-2	Study A-3.	I-2	Check diagram (100%, question 17).
P-3	Study R-1, pp. 154-158.	I-3	Check task.
P-4	Take test.	I-4	
P-5	Wire garage circuit.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 115. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR THE TERRACE, RECREATION ROOM, AND UTILITY ROOM.

PERFORMANCE OBJECTIVE - Given the necessary electrical tools, materials, and supplies, the trainee will diagram and wire a branch circuit for the terrace, recreation room, and utility room as specified by NEC standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → I-2 → P-4 → I-3 → I-4 → P-5

I-5 → I-6 → P-6 → I-7 → P-7 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Installing Recessed Fixtures" 804-5.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test (R-1, 80% accuracy).
P-2	Study R-1, pp. 164-168.	I-2	Check diagram (100%, question 18).
P-3	Take test.	I-3	Check task.
P-4	Wire terrace and recreation room.	I-4	Check diagram (100%, question 19).
P-5	Wire utility room circuit.	I-5	Check task.
P-6	Wire utility room receptacle.	I-6	Check diagram (100%, question 20).
P-7	Go to next task.	I-7	Check task.
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 116. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR THE LAVATORY, WORKSHOP, AND STORAGE ROOM.

PERFORMANCE OBJECTIVE - Given the necessary electrical tools, materials, and supplies, the trainee will diagram and wire a branch circuit for the lavatory, workshop, and storage room as specified by NEC standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → A-3 → P-2 → R-1 → P-3 → P-4 → I-1 → I-2 → P-5 → I-3

P-6 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Receptacles and Ground Fault Interrupters" 803-3.
R-2			
R-3		A-3	"Workshop Lighting and Receptacles" 804-14.
R-4			
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Grade test (R-1, 80% accuracy).
P-2	Study A-3.	I-2	Check diagram (100%, question 16).
P-3	Study R-1, pp. 169-181.	I-3	Check task.
P-4	Take test.	I-4	
P-5	Wire branch circuit.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 117. DIAGRAM AND INSTALL AND EMERGENCY (BELL) ALARM SYSTEM.

PERFORMANCE OBJECTIVE - Given the proper electrical tools, materials, and supplies, the trainee will diagram and install an emergency (bell) alarm system as specified by NEC standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → P-4 → P-5 → I-2 → P-6 → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Installation for Signal Systems"
R-2			804-11.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check diagram.
P-2	Study R-1, pp. 265-267	I-2	Check task.
P-3	Diagram circuit, Fig. 16-8.	I-3	
P-4	Wire system.	I-4	
P-5	Check with VOM.	I-5	
P-6	Go to next task.	I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 118. DIAGRAM AND INSTALL A SMOKE DETECTOR.

PERFORMANCE OBJECTIVE - Given the necessary electrical tools, materials, and supplies, the trainee will diagram and install a smoke detector as specified by NEC standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	"Smoke and Fire Detectors" 804-13.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check diagram.
P-2	Study R-1, pp. 276-279	I-2	Check task.
P-3	Complete diagram.	I-3	
P-4	Install smoke detector.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 119. DIAGRAM AND INSTALL AN INTRUSION ALARM CIRCUIT USING MOTION DETECTOR AND CLOSED OR OPEN LOOPED CIRCUIT.

PERFORMANCE OBJECTIVE - Given the necessary electrical tools, materials, and supplies, the trainee will diagram and install an intrusion alarm circuit using motion detection and closed or open looped circuit in accordance with manufacturer's and NEC specifications.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → I-3 → P-5 → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Electrical Wiring: Residential.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 276-282.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	Check diagram (100%).
P-3	Diagram circuit.	I-3	Check task.
P-4	Complete task.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 120. DIAGRAM AND INSTALL A BATTERY-OPERATED EMERGENCY LIGHTING SYSTEM.

PERFORMANCE OBJECTIVE - Given the necessary electrical tools, materials, and supplies, the trainee will diagram and install a battery-operated emergency lighting system as specified by manufacturer's and NEC specifications.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-3 → I-1 → P-4 → I-2 → P-5 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R REFERENCE MATERIALS		**A** AUDIO VISUALS	
R-1	Electrical Wiring: Residential.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P PERFORMANCE ASSIGNMENT		**I** INSTRUCTOR EVALUATION	
P-1	Study R-1, Article 700; Emergency Systems.	I-1	Check diagram.
		I-2	Check task.
P-3	Diagram circuit.	I-3	
P-4	Install emergency lighting.	I-4	
P-5	Go to next task.	I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 121. UNDERSTAND BASIC NEC REQUIREMENTS FOR THE WIRING OF SWIMMING POOLS, SPAS, HOT TUBS, AND MASSAGE BATH TUBS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to understand the basic NEC requirementts for the wiring of swimming pools at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Residential.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 326-334.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 122. UNDERSTAND COMMERCIAL BUILDING PLANS AND SPECIFICATIONS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to understand building plans and specifications used for commercial buildings at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 1-15.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 123. UNDERSTAND ELECTRICAL SERVICE INSTALLATION PROBLEMS AND PRACTICES IN A COMMERCIAL SETTING.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to understand how to install power transformers, draw transformer connections, connect metering equipment, and install a grounding system as specified by NEC standards at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 16-42.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 124. IDENTIFY SYMBOLS AND CALCULATE PLAN DIMENSIONS ON AN ELECTRICAL DRAWING OF A COMMERCIAL BUILDING.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will identify and calculate plan dimensions on an electrical drawing of a commercial bulding at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 43-44.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

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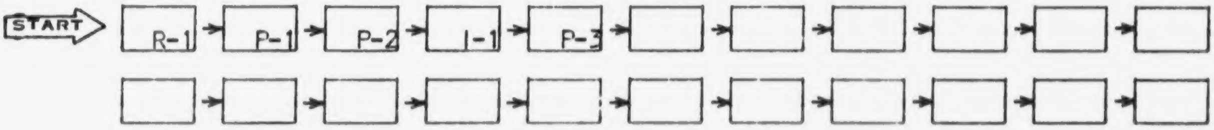
TASK - 125. DETERMINE SIZE, PROTECTION, AND INSTALLATION OF BRANCH CIRCUITS AND FEEDERS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will determine the size, protection, and installation of branch circuits and feeders at an 80% accuracy level.

PERFORMANCE GUIDE



R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 45-61.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

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TASK - 126. DETERMINE THE COMPONENTS AND CORRECT CONNECTIONS FOR LOW-VOLTAGE REMOTE-CONTROL LIGHTING.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will determine the components and correct connections for low-voltage remote-control lighting.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 62-68.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 127. REVIEW PLANS AND DETERMINE JOB REQUIREMENTS ON AN ELECTRICAL DRAWING OF A COMMERCIAL ESTABLISHMENT.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will correctly review plans and determine job requirements on an electrical drawing of a commercial establishment at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 69-71.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

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TASK - 128. SELECT PROPERLY RATED SWITCHES AND RECEPTACLES FOR COMMERCIAL WIRING APPLICATIONS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will know how to select properly rated switches and receptacles for commercial wiring applications.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 78-81.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

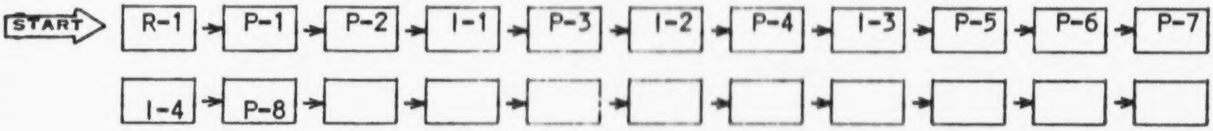
COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 129. DIAGRAM AND INSTALL CIRCUIT WITH A SINGLE-POLE SWITCH WITH FEED AT SWITCH.

PERFORMANCE OBJECTIVE - Given proper electrical tools, materials, and supplies, the trainee will diagram and install a circuit with a single-pole switch with feed at switch as specified by NEC specifications.

PERFORMANCE GUIDE



R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 77, Fig. 7-12 (A).	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check box positions.
P-3	Position two outlet boxes.	I-3	Check conduit.
P-4	Run and secure conduit to boxes.	I-4	Check task.
P-5	Pull wire through.	I-5	
P-6	Connect switch and light.	I-6	
P-7	Check with VOM.	I-7	
P-8	Go to next task.	I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 130. DIAGRAM AND INSTALL A WEATHER RESISTANCE OR EXPLOSION PROOF LIGHT AND SWITCH IN RIGID CONDUIT.

PERFORMANCE OBJECTIVE - Given proper electrical tools, materials, and supplies, the trainee will diagram and install a weather resistant or explosion proof light and switch in rigid conduit as specified by NEC specifications.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → I-3 → P-5 → P-6 → P-8

I-4 → P-9 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 77, Fig. 7-12 (A).	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check box positions.
P-3	Position two outlet boxes.	I-3	Check conduit.
P-4	Run and secure conduit to boxes.	I-4	Check task.
P-5	Pull wire through.	I-5	
P-6	Connect switch and weather resistant or explosion proof light.	I-6	
		I-7	
P-8	Check with VOM.	I-8	
P-9	Go to next task.	I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 131. DIAGRAM AND INSTALL CIRCUIT WITH A SINGLE-POLE SWITCH WITH FEED AT LIGHT.

PERFORMANCE OBJECTIVE - Given proper electrical tools, materials, and supplies, the trainee will diagram and install a circuit with a single-pole switch with feed at light as specified by NEC specifications.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → I-3 → P-5 → P-6 → P-7

I-4 → P-8 → → → → → → → → →

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 77, Fig. 7-12 (B).	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check box positions.
P-3	Position two outlet boxes.	I-3	Check conduit.
P-4	Run and secure conduit to boxes.	I-4	Check task.
P-5	Pull wire through.	I-5	
P-6	Connect switch and light.	I-6	
P-7	Check with VOM.	I-7	
P-8	Go to next task.	I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 132. DIAGRAM AND INSTALL CIRCUIT WITH TWO THREE-WAY SWITCHES CONTROLLING TWO LUMINAIRES WITH SOURCE AT ONE LUMINAIRE.

PERFORMANCE OBJECTIVE - Given proper electrical tools, materials, and supplies, the trainee will diagram and install two three-way switches controlling two luminaires with source at one luminaire as specified by NEC specifications.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → I-3 → P-5 → P-6 → P-7

I-4 → P-8 → → → → → → → → →

R REFERENCE MATERIALS

R-1 Electrical Wiring: Commercial.

R-2

R-3

R-4

R-5

A AUDIO VISUALS

A-1

A-2

A-3

A-4

A-5

P PERFORMANCE ASSIGNMENT

P-1 Study R-1, p. 80 (question 11).

P-2 Complete diagram.

P-3 Position outlet/switch boxes.

P-4 Bend and attach conduit to boxes.

P-5 Pull wire through.

P-6 Attach luminaires and switches.

P-7 Check with VOM.

P-8 Go to next task.

P-9

P-10

P-11

I INSTRUCTOR EVALUATION

I-1 Check diagram.

I-2 Check box positions.

I-3 Check conduit.

I-4 Check task.

I-5

I-6

I-7

I-8

I-9

I-10

I-11

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 133. DIAGRAM AND INSTALL CIRCUIT WITH TWO THREE-WAY SWITCHES AND A FOUR-WAY SWITCH CONTROLLING A LIGHT.

PERFORMANCE OBJECTIVE - Given proper electrical tools, materials, and supplies, the trainee will diagram and install a circuit with two three-way switches and a four-way switch controlling a light as specified by NEC specifications.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → I-3 → P-6

P-7 → P-8 → I-4 → P-9 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	A	**AUDIO VISUALS**
R-1	Electrical Wiring: Commercial.	A-1	"Three-way and Four-way Switches"
R-2			803-5.
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	I	**INSTRUCTOR EVALUATION**
P-1	Study A-1.	I-1	Check diagram.
P-2	Study R-1, p. 81 (question 12).	I-2	Check box positions.
P-3	Complete diagram.	I-3	Check conduit.
P-4	Position outlet/switch boxes.	I-4	Check task.
P-5	Bend and attach conduit to boxes.	I-5	
P-6	Pull wire through.	I-6	
P-7	Attach luminaires and switches.	I-7	
P-8	Check with VOM.	I-8	
P-9	Go to next task.	I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

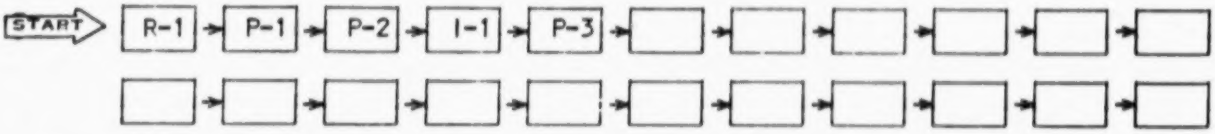
COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 134. SELECT CORRECT MATERIALS FOR THE INSTALLATION OF BRANCH CIRCUIT WIRING.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to select the correct materials for the installation of branch circuit wiring at an 80% accuracy level.

PERFORMANCE GUIDE



R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 82-103.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 135. USE THE NEC TO KNOW HOW TO INSTALL APPLIANCE CIRCUITS IN A COMMERCIAL BUILDING.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to use the NEC to know how to install appliance circuits in a commercial building at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 104-111.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 136. LIST MATERIALS FOUND IN AN ELECTRICAL DRAWING.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to list materials found in an electrical drawing that are necessary to install an electrical wiring system in a commercial building at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 112-114.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 137. UNDERSTAND THE INSTALLATION REQUIREMENTS FOR A SURFACE METAL RACEWAY, MULTI-OUTLET ASSEMBLIES, COMMUNICATION CIRCUIT, AND FLOOR OUTLETS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to understand the installation requirements for a surface metal raceway, multi-outlet assemblies, communication circuits, and floor outlets at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 →

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 126-133.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

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TASK - 138. DIAGRAM AND INSTALL A SINGLE-POLE SWITCH WITH LIGHT USING SURFACE METAL RACEWAY.

PERFORMANCE OBJECTIVE - Given proper electrical tools, materials, and supplies, the trainee will diagram and install a single-pole switch with light using surface metal raceway according to National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → I-3 → P-6

P-7 → P-8 → I-4 → P-9 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	"Switch Control" 803-4.
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1	I-1	Check diagram.
P-2	Study R-1, p. 127, Fig. 12-3.	I-2	Check box positions.
P-3	Complete diagram.	I-3	Check raceway.
P-4	Install outlet boxes.	I-4	Check task.
P-5	Install surface metal raceway.	I-5	
P-6	Pull wire.	I-6	
P-7	Make connection.	I-7	
P-8	Check with VOM.	I-8	
P-9	Go to next task.	I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 139. DIAGRAM AND INSTALL THREE RECEPTACLE OUTLETS USING SURFACE METAL RACEWAY.

PERFORMANCE OBJECTIVE - Given proper electrical tools, materials, and supplies, the trainee will diagram and install three receptacle outlets using a surface metal raceway according to National Electrical Code standards.

PERFORMANCE GUIDE

START → A-1 → P-1 → R-1 → P-2 → P-3 → I-1 → P-4 → I-2 → P-5 → I-3 → P-6

P-7 → P-8 → I-4 → P-9 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	"Receptacles and Ground Fault Interrupters" 803-3.
R-2			
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study A-1.	I-1	Check diagram.
P-2	Study R-1, p. 127, Fig. 12-4.	I-2	Check box positions.
P-3	Complete diagram.	I-3	Check raceway.
P-4	Install outlet boxes.	I-4	Check task.
P-5	Install surface metal raceway.	I-5	
P-6	Pull wire.	I-6	
P-7	Make connection.	I-7	
P-8	Check with VOM.	I-8	
P-9	Go to next task.	I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 140. PERFORM BRANCH CIRCUIT CALCULATIONS FOR A COMMERCIAL BUILDING.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to perform branch circuit calculations for a commercial building at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 134-137.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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TASK - 141. LIST THE PARTS, TYPES, AND OPERATING CHARACTERISTICS OF LAMPS USED IN COMMERCIAL BULDINGS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to list the parts, types, and operating characteristics of lamps used in commercial buildings at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 138-148.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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TASK - 142. UNDERSTAND HOW TO INSTALL LIGHTING OUTLETS AND FIXTURES IN A COMMERCIAL SETTING.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to understand how to install lighting outlets and fixtures in a commercial setting at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 129-165.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

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TASK - 143. DIAGRAM AND KNOW HOW TO CONNECT OWNER'S CIRCUITS FOR A COMMERCIAL BUILDING.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to diagram and know how to connect owner's circuits for a commercial building at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 →

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 166-173.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

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TASK - 144. UNDERSTAND INSTALLATION REQUIREMENTS FOR EMERGENCY POWER SYSTEMS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to understand the installation requirements for emergency power systems at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 174-183.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 145. USE NEC TO SELECT PROPER FUSES AND CIRCUIT BREAKERS IN A COMMERCIAL SETTING.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to use the NEC to select proper fuses and circuit breakers in a commercial setting at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 184-216.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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TASK - 146. COMPLETE SHORT-CIRCUIT CALCULATIONS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to complete short-circuit calculations at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 277-232.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

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TASK - 147. GIVEN THE BRANCH CIRCUITS, SELECT AND LOAD A PANEL BOARD AND FEEDER SIZE.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to select a panel board and feeder size given the branch circuits and load at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Commercial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 148. READ AND INTERPRET SITE PLANS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to read and interpret site plans to determine location for building electrical work and underground wiring at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Industrial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 1-9.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 149. IDENTIFY PARTS OF A UNIT SUBSTATION AND SELECT PROPER CONNECTIONS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to identify parts of a unit substation and select proper connections at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Industrial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 10-20.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 150. IDENTIFY DIFFERENT TYPES OF BUSWAYS AND LIST COMPONENTS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to identify different types of busways and list components at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Industrial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 21-31.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 151. IDENTIFY BASIC FUNCTIONS OF ELECTRIC PANEL.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to identify basic functions of electric panels at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Industrial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 32-40.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 152. UNDERSTAND HOW TO INSTALL TROLLEY BUSWAYS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to understand how to install trolley busways at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Industrial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 41-54.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 153. DESCRIBE HOW TO INSTALL SIGNALING SYSTEMS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to describe how to install a master clock, program system, fire alarm system, and paging system at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Industrial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 55-63.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 154. DESCRIBE THE VARIOUS TYPES OF MOTORS AND CONTROLLERS USED IN AN INDUSTRIAL SETTING.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to describe the various types of motors and controllers used in an industrial setting at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Industrial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 64-86.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 155. IDENTIFY LIGHTING PROTECTION PROCEDURES USED IN AN INDUSTRIAL SETTING.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to identify lighting protection procedures used in an industrial setting at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electrical Wiring: Industrial.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 121-127.	I-1	Grade test (R-1, 80% accuracy).
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - V. WIRING OPERATIONS

TASK - 156. DESCRIBE BASIC OPERATIONS OF PROGRAMMABLE LOGIC CONTROLLERS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will be able to describe the basic operation of programmable logic controllers at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R **REFERENCE MATERIALS**

R-1 Electrical Wiring: Industrial.

R-2

R-3

R-4

R-5

A **AUDIO VISUALS**

A-1

A-2

A-3

A-4

A-5

P **PERFORMANCE ASSIGNMENT**

P-1 Study R-1, pp. 134-143.

P-2 Take test.

P-3 Go to next task.

P-4

P-5

P-6

P-7

P-8

P-9

P-10

P-11

I **INSTRUCTOR EVALUATION**

I-1 Grade test (R-1, 80% accuracy).

I-2

I-3

I-4

I-5

I-6

I-7

I-8

I-9

I-10

I-11

LESSON PLAN GUIDE

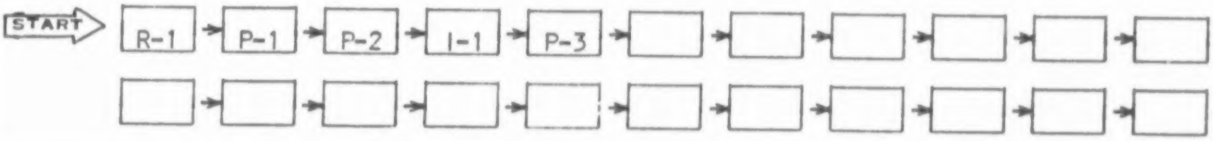
COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 157. IDENTIFY BASIC PARTS OF A THREE-PHASE SQUIRREL-CAGE INDUCTION MOTOR.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will correctly identify the basic parts of a three-phase squirrel-cage induction motor at an 80% accuracy level.

PERFORMANCE GUIDE



R **REFERENCE MATERIALS**

R-1 Electricity 4: Motors, Controls,

Alternators.

R-3

R-4

R-5

A **AUDIO VISUALS**

A-1

A-2

A-3

A-4

A-5

P **PERFORMANCE ASSIGNMENT**

P-1 Study R-1, pp. 47-66.

P-2 Take test.

P-3 Go to next task.

P-4

P-5

P-6

P-7

P-8

P-9

P-10

P-11

I **INSTRUCTOR EVALUATION**

I-1 Grade test.

I-2

I-3

I-4

I-5

I-6

I-7

I-8

I-9

I-10

I-11

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 158. DESCRIBE HOW ELECTROMECHANICAL AND SOLID-STATE RELAYS WORK.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will describe how electromechanical and solid-state relays work at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R REFERENCE MATERIALS

R-1 Electricity 4: Motors, Controls, Alternators.

R-3

R-4

R-5

A AUDIO VISUALS

A-1

A-2

A-3

A-4

A-5

P PERFORMANCE ASSIGNMENT

P-1 Study R-1, pp. 67-71.

P-2 Take test.

P-3 Go to next task.

P-4

P-5

P-6

P-7

P-8

P-9

P-10

P-11

I INSTRUCTOR EVALUATION

I-1 Grade test.

I-2

I-3

I-4

I-5

I-6

I-7

I-8

I-9

I-10

I-11

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 159. DEFINE THE OPERATIONS OF AN ACROSS-THE-LINE STARTER AND UNDERSTAND ITS BASIC APPLICATIONS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will define the operations of an across-the-line starter and understand its basic applications at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	A	**AUDIO VISUALS**
R-1	Electricity 4: Motors, Controls, Alternators.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	I	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 73-86.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 160. DEFINE THE BASIC USE OF A MANUAL STARTING COMPENSATOR.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will define the basic use of a manual starting compensator when starting a three-phase, squirrel-cage induction motor at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electricity 4: Motors, Controls,	A-1	
	Alternators.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 87-91.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 161. IDENTIFY THE BASIC PARTS AND MAJOR APPLICATIONS OF A THREE-PHASE, WOUND-ROTOR INDUCTION MOTOR.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will correctly identify the basic applications of a three-phase, wound-rotor induction motor at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	A	**AUDIO VISUALS**
R-1	Electricity 4: Motors, Controls, Alternators.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	I	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 93-104.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 162. IDENTIFY THE BASIC USE AND APPLICATION OF MANUAL SPEED CONTROLLERS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will correctly identify the basic use and application of manual speed controllers at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electricity 4: Motors, Controls, Alternators.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 105-115.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 163. IDENTIFY THE BASIC TYPES OF CONTROLLERS AND THEIR APPLICATION USED ON THREE-PHASE AC MOTORS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will correctly identify the basic types of controllers and their application on three-phase AC motors at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electricity 4: Motors, Controls, Alternators.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 127-154.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 164. UNDERSTAND BASIC MOTOR MAINTENANCE ACTIVITIES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand the basic motor maintenance activities at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-3 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Controls: Automated	A-1	
	Industrial Systems.	A-2	
R-3	Electricity 4: Motors, Controls,	A-3	
	Alternators.	A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 471-503.	I-1	Grade test.
P-2	Study R-3, pp. 171-185.	I-2	
P-3	Take test.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 165. PERFORM CONTINUITY TEST FOR MOTOR WINDINGS ON A THREE-PHASE AC MOTOR.

PERFORMANCE OBJECTIVE - Given a VOM, the trainee will perform a continuity test for motor windings on a three-phase AC motor at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electricity 4: Motors, Controls, Alternators.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 176.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 166. REPLACE AND LUBRICATE SLEEVE AND/OR BALL BEARINGS ON AN AC MOTOR ACCORDING TO MANUFACTURER'S SPECIFICATIONS.

PERFORMANCE OBJECTIVE - Given an AC motor, the trainee will replace and lubricate sleeve and/or ball bearings on an AC motor in accordance with manufacturer's specifications.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 →

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electricity 4: Motors, Controls,	A-1	
	Alternators.	A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 179-183.	I-1	Check task.
P-2	Complete task.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 167. CLEAN AND LUBRICATE AN AC MOTOR ACCORDING TO MANUFACTURER'S SPECIFICATIONS.

PERFORMANCE OBJECTIVE - Given an AC motor, the trainee will clean and lubricate the motor according to manufacturer's specifications.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electricity 4: Motors, Controls, Alternators.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 180-183.	I-1	Grade task.
P-2	Complete task.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 168. DESCRIBE THE OPERATION OF BASIC SINGLE-PHASE INDUCTION MOTORS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will describe the operation of basic single-phase induction motors at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electricity 4: Motors, Controls, Alternators.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 203-217.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 169. IDENTIFY AND DESCRIBE THE BASIC OPERATION AND CONSTRUCTION OF REPULSION MOTORS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will correctly identify and describe the basic operation and construction of repulsion motors at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electricity 4: Motors, Controls, Alternators.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 219-228.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 170. UNDERSTAND THE BASIC OPERATIONS OF A UNIVERSAL MOTOR.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand the basic operations of a universal motor at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electricity 4: Motors, Controls, Alternators.	A-1	
		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 229-234.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 171. UNDERSTAND THE BASIC PRINCIPLES OF MOTOR CONTROL.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand the basic principles of motor control at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R REFERENCE MATERIALS

R-1 Electric Motor Control.
R-2
R-3
R-4
R-5

A AUDIO VISUALS

A-1
A-2
A-3
A-4
A-5

P PERFORMANCE ASSIGNMENT

P-1 Study R-1, pp. 1-15.
P-2 Take test.
P-3 Go to next task.
P-4
P-5
P-6
P-7
P-8
P-9
P-10
P-11

I INSTRUCTOR EVALUATION

I-1 Grade test.
I-2
I-3
I-4
I-5
I-6
I-7
I-8
I-9
I-10
I-11

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 172. UNDERSTAND THE BASIC OPERATIONS OF MANUAL MOTOR STARTERS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand the basic operations of manual motor starters at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-3 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R REFERENCE MATERIALS

R-1 Electric Motor Controls: Automated Industrial Systems.

R-3 Electric Motor Control.

R-4

R-5

A AUDIO VISUALS

A-1

A-2

A-3

A-4

A-5

P PERFORMANCE ASSIGNMENT

P-1 Study R-1, pp. 73-96.

P-2 Study R-3, pp. 16-21.

P-3 Take test.

P-4 Go to next task.

P-5

P-6

P-7

P-8

P-9

P-10

P-11

I INSTRUCTOR EVALUATION

I-1 Grade test.

I-2

I-3

I-4

I-5

I-6

I-7

I-8

I-9

I-10

I-11

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 173. DESCRIBE THE BASIC OPERATIONS OF MAGNETIC STARTERS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will describe the basic operations of magnetic starters at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-3 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Electric Motor Controls: Automated	**A-1**	
	Industrial Systems.	**A-2**	
R-3	Electric Motor Control.	**A-3**	
R-4		**A-4**	
R-5		**A-5**	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 97-140.	**I-1**	Grade test.
P-2	Study R-3, pp. 22-40.	**I-2**	
P-3	Take test.	**I-3**	
P-4	Go to next task.	**I-4**	
P-5		**I-5**	
P-6		**I-6**	
P-7		**I-7**	
P-8		**I-8**	
P-9		**I-9**	
P-10		**I-10**	
P-11		**I-11**	

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 174. IDENTIFY THE BASIC APPLICATIONS OF A PUSH-BUTTON CONTROL DEVICE.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will identify the basic applications of a push-button control device at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 41-46.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 175. IDENTIFY OPERATION AND USE OF MAGNETIC RELAYS AND CONTACTORS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will identify the operation and use of magnetic relays and contactors at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-3 → P-2 → P-3 → I-1 → P-4

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Controls: Automated Industrial Systems.	A-1	
		A-2	
R-3	Electric Motor Control.	A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 311-338.	I-1	Grade test.
P-2	Study R-3, pp. 47-54.	I-2	
P-3	Take test.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 176. IDENTIFY THE BASIC TYPES AND OPERATIONS OF TIMING RELAYS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will identify the basic types and operations of timing relays at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 55-64.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 177. DESCRIBE CONNECTIONS NECESSARY TO STOP MOTORS USING PRESSURE SWITCHES AND REGULATORS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will describe the connections necessary to stop motors using pressure switches and regulators at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 65-66.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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TASK - 178. DESCRIBE THE BASIC FUNCTIONS OF FLOAT SWITCHES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will describe the basic functions of float switches at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 67.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 179. DESCRIBE THE BASIC FUNCTIONS OF FLOW SWITCHES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will describe the basic functions of flow switches at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 68-69.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 180. DESCRIBE THE USE OF LIMIT SWITCHES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will describe the use of limit switches at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, p. 70.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

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TASK - 181. DESCRIBE THE PURPOSE OF PHASE FAILURE RELAYS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will describe the purpose of phase failure relays at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 71-72.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 182. DESCRIBE THE FUNCTION OF TWO-WAY AND FOUR-WAY SOLENOID VALVES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will describe the function of two-way and four-way solenoid valves at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 73-75.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 183. IDENTIFY THE BASIC USES OF TEMPERATURE SWITCHES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will identify the basic uses of temperature switches at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 76-77.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

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COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 184. IDENTIFY THE BASIC SYMBOLS USED IN MOTOR CONTROL SCHEMATICS AND DIAGRAMS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will identify the basic symbols used in motor control schematics at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-3 → P-2 → P-3 → I-1 → P-4

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Electric Motor Controls: Automated Industrial Systems.	**A-1**	
		A-2	
R-3	Electric Motor Control.	**A-3**	
R-4		**A-4**	
R-5		**A-5**	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 31-54.	**I-1**	Grade test.
P-2	Study R-3, pp. 79-82.	**I-2**	
P-3	Take test.	**I-3**	
P-4	Go to next task.	**I-4**	
P-5		**I-5**	
P-6		**I-6**	
P-7		**I-7**	
P-8		**I-8**	
P-9		**I-9**	
P-10		**I-10**	
P-11		**I-11**	

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COURSE - ELECTRICIAN OCCUPATIONS

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TASK - 185. INTERPRET AND DRAW BASIC LINE DIAGRAMS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will interpret and draw basic line diagrams at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-3 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Controls: Automated	A-1	
	Industrial Systems.	A-2	
R-3	Electric Motor Control.	A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 66-71.	I-1	Grade test.
P-2	Study R-3, pp. 83-96.	I-2	
P-3	Take test.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 186. UNDERSTAND THE FUNCTIONS AND APPLICATIONS OF TWO-WIRE CONTROL DEVICES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand functions and applications of two-wire control devices at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 97-98.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 187. UNDERSTAND THE BASIC APPLICATIONS OF THREE-WIRE AND SEPARATE CONTROL CIRCUITS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand the basic applications of three-wire and separate control activities at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 99-102.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 188. UNDERSTAND THE APPLICATION OF HAND-OFF AUTOMATIC CONTROL DEVICES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand the purpose of hand-off automatic control devices at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 103-104.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 189. INTERPRET LINE DIAGRAMS USING MULTIPLE PUSH-BUTTON STATIONS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will interpret line diagrams using multiple push-button stations at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 105-106.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 190. INTERPRET WIRING AND LINE DIAGRAMS OF REVERSING AND INTERLOCKING CONTROLS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will interpret wiring and line diagrams of reversing and interlocking controls at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → R-3 → P-2 → P-3 → I-1 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Controls: Automated Industrial Systems.	A-1	
		A-2	
R-3	Electric Motor Control.	A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 211-240.	I-1	Grade test.
P-2	Study R-3, pp. 107-112.	I-2	
P-3	Take test.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 191. UNDERSTAND SEQUENCE CONTROL OPERATIONS WITH MOTORS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand sequence control operations with motors at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 113-115.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 192. DEFINE THE PROCESS, PURPOSE, AND OPERATION OF JOGGING CONTROLS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will define the process, purpose, and operation of jogging controls at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 221-224.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 193. UNDERSTAND THE BASIC OPERATION OF DIRECT AND PULLEY DRIVES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand the basic operation of direct and pulley drives at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 247-251.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 194. DEFINE THE FUNCTION AND APPLICATION OF GEAR MOTORS.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will define the function and application of gear motors at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 252-254.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 195. UNDERSTAND THE USE AND OPERATION OF VARIABLE FREQUENCY DRIVES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand the use and operation of variable frequency drives at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 255-257.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 196. UNDERSTAND THE BASIC OPERATIONS AND APPLICATIONS OF MAGNETIC CLUTCHES AND DRIVES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand the basic operations and applications of magnetic clutches and drives at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 258-262.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 197. UNDERSTAND THE BASIC OPERATIONS OF DC VARIABLE SPEED CONTROL MOTOR DRIVES.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will understand the basic operation of DC variable speed control motor drives at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 263-266.	I-1	Grade test.
P-2	Take test.	I-2	
P-3	Go to next task.	I-3	
P-4		I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 198. DEMONSTRATE MOTOR START-UP AND TROUBLESHOOTING KNOWLEDGE.

PERFORMANCE OBJECTIVE - Given a reading assignment, the trainee will demonstrate motor start-up and troubleshooting knowledge at an 80% accuracy level.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3

R REFERENCE MATERIALS

R-1 Electric Motor Control.
R-2
R-3
R-4
R-5

A AUDIO VISUALS

A-1
A-2
A-3
A-4
A-5

P PERFORMANCE ASSIGNMENT

P-1 Study R-1, pp. 267-276.
P-2 Take test.
P-3 Go to next task.
P-4
P-5
P-6
P-7
P-8
P-9
P-10
P-11

I INSTRUCTOR EVALUATION

I-1 Grade test.
I-2
I-3
I-4
I-5
I-6
I-7
I-8
I-9
I-10
I-11

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 199. DIAGRAM AND CONNECT A SWITCH TO OPERATE A RELAY AND MOTOR.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect a switch to operate a relay and motor at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 97-98.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 200. DIAGRAM AND CONNECT A SEPARATE CONTROL CIRCUIT TO OPERATE A MOTOR.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect a separate control circuit to operate a motor at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 101-102.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, Check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 201. DIAGRAM AND CONNECT A PUSH-BUTTON STATION TO OPERATE A RELAY AND MOTOR.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect a push-button station to operate a relay and motor at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 84-88, 99-102.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 202. DIAGRAM AND CONNECT A MECHANICALLY HELD RELAY TO CONTROL A LIGHTING LOAD.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect a mechanically held relay to control a lighting load at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 51-53.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 203. DIAGRAM AND CONNECT A SELECTOR SWITCH AND PRESSURE SWITCH TO OPERATE A RELAY AND LOAD.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect a selector switch and pressure switch to operate a relay and load at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 103.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 204. DIAGRAM AND CONNECT TWO PUSH-BUTTON STATIONS TO OPERATE A RELAY AND LOAD.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect two push-button stations to operate a relay and load at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 105.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 205. DIAGRAM AND CONNECT TWO PUSH-BUTTON STATIONS TO OPERATE A RELAY AND MOTOR SO ONE MUST START BEFORE THE OTHER.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect two push-button stations to operate a relay and motor so one must start before the other at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	**REFERENCE MATERIALS**	**A**	**AUDIO VISUALS**
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	**PERFORMANCE ASSIGNMENT**	**I**	**INSTRUCTOR EVALUATION**
P-1	Study R-1, pp. 113-114.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 206. DIAGRAM AND CONNECT TWO PUSH-BUTTON STATIONS TO OPERATE A RELAY AND MOTOR SO ONLY ONE CAN WORK AT A TIME THROUGH AUXILIARY CONTACT INTERLOCKS.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect two push-button stations to operate a relay and motor so only one can work at a time through auxiliary contact interlocks at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 107-110.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 207. DIAGRAM AND CONNECT A MOTOR STARTER WITH A START-STOP AND JOG-PUSH-BUTTON CONTROL STATION.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect a motor starter with a start-stop and jog-push-button control station at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 221-223.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 208. DIAGRAM AND CONNECT A START-STOP JOGGING CIRCUIT USING A TWO-POSITION SELECTOR SWITCH.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect a start-stop jogging circuit using a two-position selector switch at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 223-224.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 209. DIAGRAM AND CONNECT A REVERSING CONTROL PUSH-BUTTON INTERLOCK.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect a reversing control push-button interlock at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 108-110.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 210. DIAGRAM AND CONNECT TWO FORWARD AND TWO REVERSE CONTROL STATIONS WITH PUSH-BUTTON AND AUXILIARY CONTACT INTERLOCK.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect two forward and two reverse control stations with push-button and auxiliary contact interlock at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 109-110.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

LESSON PLAN GUIDE

COURSE - ELECTRICIAN OCCUPATIONS

MODULE - VI. ELECTRIC MOTORS AND CONTROLS

TASK - 211. DIAGRAM AND CONNECT A FORWARD-REVERSE CONTROL CIRCUIT WITH JOGGING IN EACH DIRECTION.

PERFORMANCE OBJECTIVE - Given a reading assignment, electric motor control devices, and appropriate tools, materials, and supplies, the trainee will diagram and connect a forward-reverse control circuit with jogging in each direction at 100% accuracy.

PERFORMANCE GUIDE

START → R-1 → P-1 → P-2 → I-1 → P-3 → I-2 → P-4 → ☐ → ☐ → ☐ → ☐

☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐ → ☐

R	REFERENCE MATERIALS	A	AUDIO VISUALS
R-1	Electric Motor Control.	A-1	
R-2		A-2	
R-3		A-3	
R-4		A-4	
R-5		A-5	

P	PERFORMANCE ASSIGNMENT	I	INSTRUCTOR EVALUATION
P-1	Study R-1, pp. 89-90, 109-110.	I-1	Check diagram.
P-2	Complete diagram.	I-2	Check task.
P-3	Complete task, check with VOM.	I-3	
P-4	Go to next task.	I-4	
P-5		I-5	
P-6		I-6	
P-7		I-7	
P-8		I-8	
P-9		I-9	
P-10		I-10	
P-11		I-11	

VIII. REFERENCES AND MATERIALS

A. References: Instructional

Alerich, W.N. *Electric Motor Control* (3rd edition). Albany, N.Y.: Delmar Publishers, Inc., 1983.

Alerich, W.N. *Electric Motor Control: Lab Manual* (3rd edition). Albany, N.Y.: Delmar Publishers, Inc., 1983.

Alerich, W.N. *Electricity 4: Motors, Controls, Alternators* (4th edition). Albany, N.Y.: Delmar Publishers, Inc., 1986.

Foley, J.H. *Electrical Wiring Fundamentals*. New York: Gregg Division, McGraw-Hill Book Co., 1981.

Mullin, R.C. *Electrical Wiring: Commercial* (6th edition) Albany, N.Y.: Delmar Publishers, Inc., 1987.

Mullin, R.C. *Electrical Wiring: Industrial* (6th edition) Albany, N.Y.: Delmar Publishers, Inc., 1987.

Mullin, R.C. *Electrical Wiring: Residential* (9th edition) Albany, N.Y.: Delmar Publishers, Inc., 1987.

National Fire Protection Association, *National Electrical Code 1987*. Quincey, MA, 1987.

Rockis, G. and Mazur, G. *Electrical Motor Controls: Automated Industrial Systems* (2nd edition). Homewood, Il: American Technical Publishers, Inc., 1987.

B. Materials: Audiovisual

1. Bergwall Productions (Filmstrips and/or VHS Cassettes)

	Order No.
Basic Electricity and Electronics: Direct Current	801
"The Electron Theory"	-1
"Circuits, Symbols and Diagrams"	-2
"Meter Reading and Ohm's Law"	-3
"Series Circuits"	-4
"Parallel Circuits"	-5
"Resistors and Complex Circuits"	-6
Basic Electricity and Electronics: Alternating Current	802
"Alternating Current: What It Is and Where It's Used"	-1

"Alternating Current: Voltage and Power"	-2
"Magnetism and Electromagnetism"	-6
"Transformers"	-8
Electrical Housewiring Explained	803
"National Electric Code and Requirements"	-1
"Electrical Wiring Techniques"	-2
"Receptacles and Ground Fault Interrupters"	-3
"Switch Control"	-4
"Three-way and Four-way Switches"	-5
"Fuse and Circuit Breaker Panels"	-6
Residential Electrical Wiring: Planning and Roughing In	804A
"Estimating The Job"	-1
"Planning The Job"	-2
"Underground Service Entrance"	-3
"Roughing-In Wiring"	-4
"Installing Recessed Fixtures"	-5
Finishing the Installation	804B
"Installing Bathroom Ceiling Light and Exhaust Fan"	-6
"Special Purpose Outlets"	-7
"Small Appliance Circuits"	-8
"Hanging the Fixtures and Setting the Receptacles"	-10
Low Voltage and Special Circuits	804C
"Installation for Signal Systems"	-11
"Installation for Telephone, TV"	-12
"Smoke and Fire Detectors"	-13
"Workshop Lighting and Receptacles"	-14
"Outdoor Lighting-Part One"	-15
"Outdoor Lighting-Part Two"	-16
Rigid Electrical Conduit	818
"Cutting"	-1
"Threading"	-2
"Conduit Bending: Part One"	-3
"Conduit Bending: Part Two"	-4
Tools for the Electrical Trades	819
"Wearing Apparel and Safety"	-1
"Basic Hand Tools"	-2
"Cutting Tools"	-3
"Specialty Tools"	-4

2. Benfield International Corp. (VHS Cassette)
"The Benfield Bending Technique"

Materials: Training Aids

1. Technical Training Aids
Electrical Motor Control Trainees

Panel "A"	F-1200A
Panel "B"	F-1200B
Panel "C"	F-1200C
Panel "D"	F-1200D
Panel "E"	F-1200E

2. Control Panel Construction procedures may be found in Alerich, W.A. Electric Motor Control: Lab Manual (3rd edition). 1983.

C. References: Developmental

Alabama State Department of Education. Curriculum Standards for Electricity, 1982.

Kentucky Bureau of Education. V-Tecs Guide for Industrial Electrician. 1981.

Kerns, A.F. and Neeley. R.E. Dictionary of Worker Traits: Volume Two. Philadelphia, PA: Vocational Research Institute, 1987.

Occupational Education Articulation Program Task Committee. Articulated, Performance-Based Instruction Objectives Guide for Electricity/ Industrial Electricity. Greenville, S.C.: The School District of Greenville College and Greenville Technical College, 1984.

Skills Training and Education Program. Electrical Cluster. Montgomery, AL: Alabama Department of Postsecondary Education, 1984.

South Carolina Department of Education. V-Tecs Guide for Industrial Maintenance Mechanic. Columbia, S.C., 1986.

Tennessee Department of Education. V-Tecs Guide for House Electrician, 1981.

U.S. Department of Labor, Employment and Training Administration. Dictionary of Occupational Titles (4th edition). Washington: Superintendent of Documents, U.S. Government Printing Office, 1977.

U.S. Department of Labor, Employment and Training Administration. Dictionary of Occupational Titles Fourth Edition Supplement. Washington: Superintendent of Documents, U.S. Government Printing Office, 1986.

Winefordner, D.W. Worker Trait Group Guide. Appalachia Educational Laboratory, Inc., Bloomington, Il.: McKnight Publishing Co., 1978.

D. References and Materials: Addresses

D. References and Materials: Addresses

American Technical Publishers, Inc.
1155 West 175th Street
Homewood, IL 60430

Benfield International
Post Office Box 544
Fort Lauderdale, FL 33302

Bergwall Productions, Inc.
106 Charles Lindbergh Boulevard
Uniondale, NY 11553-3695

Delmar Publishers
2 Computer Drive West
Albany, NY 12212-5015

East Central Network and Illinois
Vocational Curriculum Center
Sangamon State University
Springfield, IL 62708

Gregg/McGraw-Hill
13955 Manchester Road
Manchester, MO 63011

Vocational-Technical Education
Consortium of States
1866 Southern Lane
Decatur, Georgia 30033-4097

Southeast Curriculum
Coordination Network
Research and Curriculum Unit
Mississippi State University
Post Office Drawer DX
Mississippi State, MS 39762

Technical Training Aids
Post Office Box 20042
Birmingham, AL 35216

The Center for Instructional
Development and Services
Florida State University
Stone Building
Tallahassee, FL 32306-3019

APPENDIX A

PRE-TEST STATEMENT, STEP FORM 58

PRE-TEST STATEMENT

This is to affirm that this plan of instruction has been explained to me. I have been pre-tested to verify competency in those skills where I have previous experience. In no other competencies in this plan of instruction do I claim any skill at the time of pre-testing.

____
Trainee's Signature

____
Date

Course: ____

Instructor: ____

STEP FORM 58
Revised 3/88

APPENDIX B

JOB DEMAND CHARACTERISTICS AND OCCUPATIONAL GROUP ARRANGEMENTS

1. JOB DEMAND CHARACTERISTICS CHART
2. EXIT OCCUPATIONS ARRANGED BY OCCUPATIONAL CATEGORIES, DIVISIONS AND GROUPS

B. Job Demand Characteristics and Occupational Group Arrangements

This part of the manual briefly describes the Job Demand Characteristics Chart and occupational group arrangements of the related exit occupations. This information will provide the reader with applicant selection criteria and portray the degree of inter-relationship between exit occupations found on the Job Demand Characteristics Chart.

The Job Demand Characteristics Chart summarizes worker traits and qualifications for exit occupations that have been selected for each training program. The Department of Labor has established criteria for each of the following categories found on the Job Demand Characteristics Chart: D.O.T. Code, General Education Development, Vocational Aptitudes, Physical Demands, Working Conditions and Interests. During assessment, applicants must generally meet or exceed the values assigned to selected categories found on The Job Demand Characteristics Chart in order for them to be considered as candidates for enrollment into training programs. Further explanation of the job demand characteristics and their assigned values may be found in the publication entitled, The Handbook of Job Demand Characteristics Charts.

Following the Job Demand Characteristics Chart, the reader will find detailed descriptions of each selected exit occupation which may be found in the section entitled, Exit Occupations Arranged by Occupational Categories, Divisions and Groups. In this section, each exit occupation has been assigned a job title and numeric code as found in the Dictionary of Occupational Titles, (1977). Each title and its respective definition is arranged by the occupational group (first three digits) and in order of involvement with data, people, and things (second three digits). The final three digits provide a unique code for each title and are usually assigned alphabetically within each group. The definitions help..."identify closely related occupations; provides guide to job transfers, or advancement" (D.O.T., pp. XXIV).

Each job definition is found within its properly designated single digit occupational category (one of nine categories); two digit occupational division (one of 82 divisions); and three digit occupational group (one of 559 groups). Information has been arranged in this manner to help provide a "broad perspective on inter-relationships of occupations and career ladders" (D.O.T., pp. XXIV).

The inter-relationships portrayed in this section reflect the cluster concept of curriculum development whereby a group of related jobs or exit occupations are clustered about a primary occupation. In addition, information in this section will help the reader determine training related placements in accordance with guidelines given by the Division of Employment and Training.

JOB DEMAND CHARACTERISTICS CHART FOR ELECTRICIAN CLUSTER

EXIT OR SPIN-OFF OCCUPATIONS:	D.O.T. CODE	GED M L	VOCATIONAL APTITUDES G V N S P Q K F M E C	PHYSICAL DEMANDS	WORKING CONDITIONS	INTERESTS
TELEVISION-CABLE INSTALLER HELPER	821.684-010	3 2	3 4 4*3*3*4 4*4*3*4 4	L - 2,4	0	1A,3A,4B
ELECTRIC MOTOR ASSEMBLER	721.684-022	1 2	4 4 4 4*4*5 3*2*3*5 4	L - 4	I	1A,3A,4B
PARTS CLERK (RT./ WHOLE TR.)	279.357-062	3 4	3*3*3*3 3 3*4 3 3 5 4	L - 4,5,6	I	1B,2A
CONDUIT/PIPE INSTALLER	869.381-018	2 3	3 4 3*3*3*4 3*3*3*4 5	H - 2,3,4,6	I - 5	1A,4B
EQUIPMENT INSTALLER HELPER (TELEPHONE)	822.664-010	2 2	4 4 3*4*3*4 4*3*3*4 4	M - 2,3,4,5	I	1A,3A
PROTECTIVE-SIGNAL INSTALLER/REPAIRER HELPER	822.664-010	2 2	4 4 3*4*3*4 4*3*3*4 4	M - 2,3,4,5	I	1A,3A

EXIT OR SPIN-OFF OCCUPATIONS:	D.O.T. CODE	GED M L	VOCATIONAL APTITUDES G V N S P Q K F M E C	PHYSICAL DEMANDS	WORKING CONDITIONS	INTERESTS
ELECTRICIAN HELPER (ANY INDUSTRY)	829.684-022	2 2	3 4 4 3*3*4 3*3 3*4 4	M - 2,3,4	B - 6	1A,3B,4B
ELECTRICIAN, RESIDENTIAL	824.261-010	4 3	2 3 2*2*2*2 3*3*3*4 4	M - 2,3,4,6	B - 6	1A,4B,5B
ELECTRICIAN, COMMERCIAL	824.261-010	4 3	2 3 2*2*2*2 3*3*3*4 4	M - 2,3,4,6	B - 6	1A,4B,5B
ELECTRICIAN, INDUSTRIAL	824.261-010	4 3	2 3 2*2*2*2 3*3*3*4 4	M - 2,3,4,6	B - 6	1A,4B,5B

* Critical Aptitudes -- Critical aptitudes are those aptitudes which are significant in the successful performance of a job.

References

Worker Trait Group Guide, 1978, p. xv.

Classification of Jobs According to Worker Trait Factors, 1984.

EXIT OCCUPATIONS ARRANGED BY OCCUPATIONAL CATEGORIES, DIVISIONS AND GROUPS

8 STRUCTURAL WORK OCCUPATIONS

This category includes occupations concerned with fabricating, erecting, installing, paving, painting, and repairing structures and structural parts, such as bridges, building, roads, motor vehicles, cables, internal combustion engines, girders, plates, and frames. Generally, work is outside, except for factory production line occupations. The worker's relationship to handtools and power tools is more important than that to stationary machines, which are also used. Knowledge of the properties (stress, strain, durability, resistance) of the materials used (wood, metal, concrete, glass, clay) is often a requirement.

82 ELECTRICAL ASSEMBLING, INSTALLING, AND REPAIRING OCCUPATIONS

This division includes occupations concerned with assembling, installing, erecting, and repairing electrical equipment and related structures designed for electrical power generation, transmission, and distribution; communication, signaling, and object detection; process control, fire control, and data processing; transportation and materials-handling; heating, air conditioning, refrigeration, and illumination; and other industrial, commercial, and domestic electrical applications.

821 OCCUPATIONS IN ASSEMBLY, INSTALLATION, AND REPAIR OF TRANSMISSION AND DISTRIBUTION LINES AND CIRCUITS

This group includes occupations concerned with erecting and repairing powerlines and circuits for transmission and distribution of electricity, and assembling and erecting related equipment and structures.

821.281-010 TELEVISION-CABLE INSTALLER (any ind.)

Installs CATV (Community antenna television distribution cables) on customer's premises; Measures television signal strength at utility pole, using electronic test equipment. Computes impedance of wire from pole to house to determine additional resistance needed for reducing signal to desired level. Installs terminal boxes and strings lead-in wires, using electrician's tools. Connects television set to antenna system and evaluates incoming signal. Adjusts and repairs antenna system to insure optimum reception.

822 OCCUPATIONS IN ASSEMBLY, INSTALLATION, AND REPAIR OF WIRE COMMUNICATION, DETECTION, AND SIGNALING EQUIPMENT

This group includes occupations concerned with erecting, installing, or repairing overhead and underground telephone and telegraph lines and equipment; and installing or repairing wiring and equipment within buildings to provide communication, detection, and signaling services.

822.381-010 EQUIPMENT INSTALLER (tel. & tel.)

Installs telegraphic transmitting and receiving equipment in telegraph company offices and on customer's premises, following floor-plan sketches and wiring diagrams: Installs and connects equipment, such as teletypewriters, tickers, facsimile-recording devices, and reperforators, using handtools and soldering iron. Tests equipment for circuit continuity, using testing instruments, such as voltmeter and ohmmeter. May wire and assemble equipment prior to installation [ASSEMBLER (tel. & tel.)]. May be designated according to equipment installed as CALL-BOX WIRER (tel. & tel.); TELEGRAPHIC-TYPEWRITER INSTALLER (tel. & tel.); TELEGRAPH-REPEATER INSTALLER (tel. & tel.); TELETYPE INSTALLER (tel. & tel.); TICKER INSTALLER (tel. & tel.); TIME-SIGNAL WIRER (tel. & tel.).

822.664-014 PROTECTIVE-SIGNAL REPAIRER HELPER (bus. ser.) burglar-alarm-repairer helper.

Assists PROTECTIVE-SIGNAL REPAIRER (bus. ser.) to repair electrical protective signaling systems: Examines electrical units for loose connections and broken insulation. Tightens connections, using wrench. Disassembles defective parts of system, using handtools. Removes and replaces defective wiring and solders connections, using soldering iron. Performs other duties as described under HELPER (any ind.). Usually required to possess identification card issued by local authorities.

822.664-014 PROTECTIVE-SIGNAL INSTALLER HELPER (bus. ser.)

Assists PROTECTIVE-SIGNAL INSTALLER (bus. ser.) to install protective signaling systems: by erecting conduits, pulling wires, fastening pipe straps, and making soldered connections. Makes small installations independently by erecting conduits, pulling wires, fastening pipe straps, and making soldered connections. Makes small installations independently. Performs other duties as described under HELPER (any ind.). Usually required to possess identification card issued by local authorities.

824 OCCUPATIONS IN ASSEMBLY, INSTALLATION, AND REPAIR OF LIGHTING EQUIPMENT AND BUILDING WIRING, N.E.C.

This group includes occupations, not elsewhere classified, concerned with wiring buildings and adjacent yards to provide electricity for power and lighting equipment, conduit switches, junction and fuse boxes, and related accessories and controls; and repairing wiring and components.

824.261-010 ELECTRICIAN (any ind.) wirer.

Plans layout, installs, and repairs wiring, electrical fixtures, apparatus, and control equipment: Plans new or modified installations to minimize waste of materials, provide access for future maintenance, and avoid unsightly, hazardous, and unreliable wiring, consistent with specifications and local electrical codes. Prepares sketches showing location of wiring and equipment, or follows diagrams or blueprints, insuring that concealed wiring is installed before completion of future walls, ceilings, and flooring. Measures, cuts, bends, threads, assembles, and installs electrical conduit, using such tools as hacksaw, pipe threader, and conduit bender. Pulls wiring through conduit, assisted by ELECTRICIAN HELPER (any ind.). Splices wires by stripping insulation from terminal leads with knife or pliers, twisting or soldering wires together, and applying tape or terminal caps. Connects wiring to lighting fixtures and power equipment, using handtools. Installs control and distribution apparatus, such as switches, relays, and circuit-breaker panels, fastening in place with screw or bolts, using hand-tools and power tools. Connects power cables to equipment, such as electric range or motor, and installs grounding leads. Tests continuity of circuit to insure electrical compatibility and safety components, using testing instru-ments such as ohmmeter, battery and buzzer, and oscilloscope. Observes functioning of installed equipment or system to detect hazards and need for adjustments, relocation, or replacement. May repair faulty equipment or systems [ELECTRICAL REPAIRER (any ind.)]. May be required to hold license. May cut and weld steel structural members, using flame-cutting and welding equipment. May be designated according to work location as MINE ELECTRICIAN (mining & quarrying).

829 OCCUPATIONS IN INSTALLATION AND REPAIR OF ELECTRICAL PRODUCTS, N.E.C.

This group includes occupations, not elsewhere classified, concerned with assembling, installing, erecting, and repairing electrical equipment and related structures.

829.684-022 ELECTRICIAN HELPER (any ind.) wirer helper.

Assists ELECTRICIAN (any ind.) to install and repair electrical wiring fixtures and equipment, performing any combination of following tasks: Measures, cuts, and bends wire and conduit, using ruler and handtools. Drills holes for wiring, using power drill, and pulls or pushes wiring through opening. Assists in lifting, positioning, and fastening objects, such as wiring, conduit, and motors. Performs minor repairs, such as replacing fuses, light sockets, bulbs, and switches, using handtools. Maintains tools and equipment and keeps supplies and parts in order. Disassembles defective electrical equipment, such as motors, using handtools. Performs other duties as described under HELPER (any ind.).

86 CONSTRUCTION OCCUPATIONS, N.E.C.

This division includes craft and noncraft occupations, not elsewhere classified, concerned with building and repairing structures.

869 MISCELLANEOUS CONSTRUCTION OCCUPATIONS, N.E.C.

This group includes occupations, not elsewhere classified, concerned with building and repairing structures.

869.381-018 PIPE INSTALLER (const.; light, heat, & power)

Installs conduit pipe used to protect electrical wiring in buildings and transportation equipment: Reads blueprints to determine size, position, and amount of conduit pipe required. Cuts threads and bends pipe, using handtools and power tools. Installs pipe in walls, ceilings, and floors.

7 BENCHWORK OCCUPATIONS

This category includes occupations concerned with using body members, handtools, and bench machines to fabricate, inspect, or repair relatively small products, such as jewelry, phonographs, light bulbs, musical instruments, tires, footwear, pottery, and garments. The work is usually performed at a set position or station in a mill, plant, or shop, at a bench, worktable, or conveyor. Workers in more complex jobs may be required to read blueprints, follow patterns, use a variety of handtools, and assume responsibility for meeting standards. Other jobs may only require workers to follow standardized procedures.

72 OCCUPATIONS IN ASSEMBLY AND REPAIR OF ELECTRICAL EQUIPMENT

This division includes occupations concerned with assembling, fabricating, or repairing equipment, components, and parts for equipment to transmit, control, or convert electrical power; signaling and detection equipment; and home radios, television sets, and phonographs.

721 OCCUPATIONS IN ASSEMBLY AND REPAIR OF MOTORS, GENERATORS, AND RELATED PRODUCTS

This group includes occupations concerned with assembling and repairing electric motors, power generators, motor-generator sets, railway motors and control equipment; and motors, generators, and control equipment for gasoline-electric and oil-electric buses and trucks. Occupations concerned with winding and assembling coils, magnets, armatures, and related components are included in group 724.

721.684-022 ELECTRIC-MOTOR ASSEMBLER (elec. equip.) assembler; assembly hand.
Assembles subassemblies and parts of dynamotors, converters, and electric motors used in instruments, appliances, and power tools, performing any combination of following tasks, using power tools and handtools: Bolts field windings and brush holders into motor housings, using wrenches, screwdrivers, and holding fixtures. Presses bushings and bearings into motor head, using arbor press. Secures fans and gears to armature shaft, using nuts and lock washers, and places armature shaft in bearings. Solders or screws electrical leads to brushes, and switch and cord assembly, using soldering iron. Assembles end brackets and base to housing and fastens with screws. Lubricates gears and other moving parts, using oilcan, paddle, or grease gun. Turns shaft to insure free movement of parts. May screw covers on motor ends to keep out dirt and moisture during shipment. When replacing defective parts in motors is designated REPAIRER, ELECTRIC MOTORS (elec. equip.). May be designated according to type motor assembled as ASSEMBLER, INSTRUMENT MOTORS (elec. equip.) or part assembled as BRUSH-HOLDER ASSEMBLER (elec. equip.).

2 CLERICAL AND SALES OCCUPATIONS

This category is composed of two occupational subcategories. Clerical occupations which are classified in Divisions 20 through 24, include those activities concerned with preparing, transcribing, systematizing, and preserving written communications and records; distributing information; and collecting accounts. Sales occupations, which are classified in Divisions 25 through 29, include those activities concerned with influencing customers in favor of a commodity or service. Occupations closely identified with sales transactions are included even though they do not involve active participation in the transactions.

27 SALES OCCUPATIONS, COMMODITIES, N.E.C.

This division includes occupations concerned with selling commodities, not included in division 26, when knowledge of the commodities sold is required.

279 SALES OCCUPATIONS, MISCELLANEOUS COMMODITIES, N.E.C.

This group includes occupations, not elsewhere classified, concerned with selling commodities.

279.357-062 SALESPERSON, PARTS (ret. tr.; whole. tr.) counter clerk; parts clerk.

Sells spare and replaceable parts and equipment from behind counter in agency, repair shop, or parts store: Ascertains make, year, and type of part needed, inspects damaged part to determine part required, or advises customer of part needed according to description of malfunction. Discusses use and features of various parts, based on knowledge of engines, machinery, or equipment. Reads catalog for stock number, price, and replacement parts. Advises customer on substitution or modification of parts when replacement is not available. Examines returned part to determine if it is defective and exchanges part or refunds money. Fills customer orders from stock, finding parts by location and stock number from catalog. Marks and stores parts in stockroom according to prearranged plan. Receives and fills telephone orders for parts. Performs other duties as described under SALESPERSON (ret. tr.; whole. tr.). May measure engine parts to determine whether similar parts may be machined down or built up to required size, using micrometers and knowledge of part specifications, machining, metalizing, and rebuilding operations. Usually specializes in selling parts for one type of machinery or equipment and is designated according to part sold as COUNTER CLERK, APPLIANCE PARTS (ret. tr.; whole. tr.); COUNTER CLERK, AUTOMOTIVE PARTS (ret. tr.; whole. tr.); COUNTER CLERK, FARM EQUIPMENT PARTS (ret. tr.; whole. tr.); COUNTER CLERK, INDUSTRIAL MACHINERY AND EQUIPMENT PARTS (ret. tr.; whole. tr.); COUNTER CLERK, RADIO, TELEVISION, AND ELECTRONICS PARTS (ret. tr.; whole. tr.); COUNTER CLERK, TRACTOR PARTS (ret. tr.; whole. tr.); COUNTER CLERK, TRUCK PARTS (ret. tr.; whole. tr.).

MASTER TITLES AND DEFINITIONS

Master definitions describe work duties that are common or potentially common to a number of jobs. Jobs in which the common duties are an essential part refer to the Master definition title as a device to save space and to avoid repetition of the common duties. Clues to classifications of jobs utilizing Master definitions are provided.

HELPER (any ind.)

A worker who assists another worker, usually of a higher level of competence or expertness, by performing a variety of duties, such as furnishing another worker with materials, tools, and supplies; cleaning work area, machines, and equipment; feeding or offbearing machines; holding materials or tools; and performing other routine duties. A HELPER (any ind.) may learn a trade but does so without an agreement with employer that such is the purpose of their relationship. Consequently, the title HELPER (any ind.) is sometimes used as synonym for APPRENTICE (any ind.), a practice that is incorrect technically. A worker whose duties are limited or restricted to one type of activity, such as moving materials from one department to another, feeding machines, removing products from conveyors or machines, or cleaning machines or work areas is not technically a HELPER (any ind.) and is classified according to duties performed as MATERIAL HANDLER (any ind.); MACHINE CLEANER (any ind.); CLEANER, INDUSTRIAL (any ind.). A worker who performs a variety of duties to assist another worker is a HELPER (any ind.) technically and is classified according to worker assisted as BRICKLAYER HELPER (const.); DRY-CLEANER HELPER (clean. dye., & press).

APPENDIX C

COMPETENCY CHART

COMPETENCY CHART

TRAINEE ________________ INSTRUCTOR ________________ COMPETENCY CHART FOR ELECTRICIAN CLUSTER	Date of Pre-Test	Date Competency Demonstrated	Instructor's Initials	Trainee's Initials	TELEVISON-CABLE Installer Helper (821.684-010)	ELECTRIC MOTOR ASSEMBLER (721.684-022)	PARTS CLERK (RT./WHOLE TR.) (279.357-062)	CONDUIT/PIPE INSTALLER (869.381-018)	EQUIPMENT INSTALLER HELPER (TELEPHONE) (822.664-010)	PROTECTIVE-SIGNAL-INSTALLER/REPAIRER HELPER (822.664-010)	ELECTRICIAN HELPER (ANY INDUSTRY) (829.684-022)	ELECTRICIAN, RESIDENT. (824.261-010) ENTRY LEVEL	ELECTRICIAN, COMMERCIAL (824.261-010) ENTRY LEVEL	ELECTRICIAN, INDUSTRIAL (824.261-010) ENTRY LEVEL				
I. ORIENTATION AND SAFETY																		
1. APPLY SCHOOL POLICIES AND PROCEDURES.					X	X	X	X	X	X	X	X	X	X				
2. APPLY SHOP SAFETY RULES AND PROCEDURES.					X	X	X	X	X	X	X	X	X	X				
3. APPLY FIRE SAFETY RULES AND PROCEDURES.					X	X	X	X	X	X	X	X	X	X				
4. APPLY ELECTRICAL SAFETY RULES AND PROCEDURES.					X	X	X	X	X	X	X	X	X	X				
5. COMPLETE APPROVED CPR TRAINING.					X	X	X	X	X	X	X	X	X	X				
II. APPLIED MATHEMATICS																		
6. ADD WHOLE NUMBERS.					X	X	X	X	X	X	X	X	X	X				
7. SUBTRACT WHOLE NUMBERS.					X	X	X	X	X	X	X	X	X	X				
8. MULTIPLY WHOLE NUMBERS.					X	X	X	X	X	X	X	X	X	X				
9. DIVIDE WHOLE NUMBERS.					X	X	X	X	X	X	X	X	X	X				
10. ADD COMMON FRACTIONS.					X	X	X	X	X	X	X	X	X	X				
11. SUBTRACT COMMON FRACTIONS.					X	X	X	X	X	X	X	X	X	X				
12. MULTIPLY COMMON FRACTIONS.					X	X	X	X	X	X	X	X	X	X				
13. DIVIDE COMMON FRACTIONS.					X	X	X	X	X	X	X	X	X	X				
14. ADD DECIMAL FRACTIONS.					X	X	X		X	X	X	X	X	X				

COMPETENCY CHART

TRAINEE ____ INSTRUCTOR ____ COMPETENCY CHART FOR ELECTRICIAN CLUSTER ____	Date of Pre-Test	Date Competency Demonstrated	Instructor's Initials	Trainee's Initials	TELEVISON-CABLE INSTALLER HELPER (821.684-010)	ELECTRIC MOTOR ASSEMBLER (721.684-022)	PARTS CLERK (RT./WHOLE TR.) (279.357-062)	CONDUIT/PIPE INSTALLER (869.381-018)	EQUIPMENT INSTALLER HELPER (TELEPHONE) (822.664-010)	PROTECTIVE-SIGNAL-INSTALLER/REPAIRER HELPER (822.664-010)	ELECTRICIAN HELPER (ANY INDUSTRY) (829.684-022)	ELECTRICIAN, RESIDENT. (824.261-010) ENTRY LEVEL	ELECTRICIAN, COMMERCIAL (824.261-010) ENTRY LEVEL	ELECTRICIAN, INDUSTRIAL (824.261-010) ENTRY LEVEL				
15. SUBTRACT DECIMAL FRACTIONS.					X	X	X		X	X	X	X	X	X				
16. MULTIPLY DECIMAL FRACTIONS.					X	X	X		X	X	X	X	X	X				
17. DIVIDE DECIMAL FRACTIONS.					X	X	X		X	X	X	X	X	X				
18. SOLVE PROBLEMS USING DECIMAL AND COMMON FRACTION EQUIVALENTS.					X	X	X		X	X	X	X	X	X				
19. SOLVE PROBLEMS USING PERCENT AND PERCENTAGE.					X	X	X		X	X	X	X	X	X				
20. SOLVE PROBLEMS USING AVERAGES AND ESTIMATES.					X	X	X		X	X	X	X	X	X				
21. SOLVE PROBLEMS USING LENGTH MEASUREMENTS.					X	X	X		X	X	X	X	X	X				
22. SOLVE PROBLEMS USING AREA MEASUREMENTS.					X	X	X		X	X	X	X	X	X				
23. SOLVE PROBLEMS USING VOLUME AND MASS MEASUREMENTS.									X	X	X	X	X	X				
24. SOLVE PROBLEMS USING ENERGY AND TEMPERATURE MEASUREMENTS.									X	X	X	X	X	X				
25. SOLVE RATIO PROBLEMS.									X	X	X	X	X	X				
26. SOLVE PROPORTION PROBLEMS.									X	X	X	X	X	X				
27. APPLY PRINCIPLE OF REPRESENTATION IN																		

COMPETENCY CHART

TRAINEE ____________ INSTRUCTOR ____________ COMPETENCY CHART FOR ELECTRICIAN CLUSTER ____________	Date of Pre-Test	Date Competency Demonstrated	Instructor's Initials	Trainee's Initials	TELEVISON-CABLE INSTALLER HELPER (821.684-010)	ELECTRIC MOTOR ASSEMBLER (721.684-022)	PARTS CLERK (RT./WHOLE TR.) (279.357-062)	CONDUIT/PIPE INSTALLER (869.381-018)	EQUIPMENT INSTALLER HELPER (TELEPHONE) (822.664-010)	PROTECTIVE-SIGNAL-INSTALLER/REPAIRER HELPER (822.664-010)	ELECTRICIAN HELPER (ANY INDUSTRY) (829.684-022)	ELECTRICIAN, RESIDENT. (824.261-010) ENTRY LEVEL	ELECTRICIAN, COMMERCIAL (824.261-010) ENTRY LEVEL	ELECTRICIAN, INDUSTRIAL (824.261-010) ENTRY LEVEL				
FORMULAS.									X	X	X	X	X	X				
28. APPLY PRINCIPLE OF REARRANGEMENT IN FORMULAS.									X	X	X	X	X	X				
29. APPLY PRINCIPLE OF GENERAL SIMPLE FORMULAS.									X	X	X	X	X	X				
30. APPLY OHM'S LAW FORMULA.									X	X	X	X	X	X				
31. APPLY PRINCIPLE OF POWER FORMULAS.									X	X	X	X	X	X				
III. BASIC ELECTRICAL INFORMATION																		
32. DIAGRAM AND CONNECT A SIMPLE SERIES CIRCUIT.						X	X	X	X	X	X	X	X	X				
33. DIAGRAM AND CONNECT A SIMPLE PARALLEL CIRCUIT.						X	X	X	X	X	X	X	X	X				
34. DIAGRAM AND CONNECT A COMPLEX CIRCUIT.						X	X	X	X	X	X	X	X	X				
35. CONSTRUCT A SIMPLE ELECTROMAGNET.						X	X	X	X	X	X	X	X	X				
36. UNDERSTAND BASIC NEC TERMINOLOGY.						X	X	X	X	X	X	X	X	X				
37. IDENTIFY AND KNOW PROPER USE OF COMMONLY USED																		
ELECTRICAL TOOLS AND EQUIPMENT.					X	X	X	X	X	X	X	X	X	X				
38. MEASURE AC, DC, VOLTAGE, AND OHMS USING A VOM						X	X		X	X	X	X	X	X				
39. CHECK CONTINUITY AND MEASURE RESISTANCE USING																		
OHMMETER.						X	X		X	X	X	X	X	X				

COMPETENCY CHART

TRAINEE ____________________

INSTRUCTOR ____________________

COMPETENCY CHART FOR ELECTRICIAN CLUSTER

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	Date of Pre-Test	Date Competency Demonstrated	Instructor's Initials	Trainee's Initials	TELEVISON-CABLE INSTALLER HELPER (821.684-010)	ELECTRIC MOTOR ASSEMBLER (721.684-022)	PARTS CLERK (RT./WHOLE TR.) (279.357-062)	CONDUIT/PIPE INSTALLER (869.381-018)	EQUIPMENT INSTALLER HELPER (TELEPHONE) (822.664-010)	PROTECTIVE-SIGNAL-INSTALLER/REPAIRER HELPER (822.664-010)	ELECTRICIAN HELPER (ANY INDUSTRY) (829.684-022)	ELECTRICIAN, RESIDENT. (824.261-010) ENTRY LEVEL	ELECTRICIAN, COMMERCIAL (824.261-010) ENTRY LEVEL	ELECTRICIAN, INDUSTRIAL (824.261-010) ENTRY LEVEL				
40. USE CLAMP-ON AMPMETER TO MEASURE CURRENT IN A CIRCUIT.						X	X		X	X	X	X	X	X				
IV. CONDUIT OPERATIONS																		
41. IDENTIFY COMMONLY USED CONDUIT.							X	X		X	X	X	X	X				
42. CUT AND DEBURR RIGID CONDUIT TO LENGTH USING A HACKSAW AND A PIPE CUTTER.							X	X		X	X	X	X	X				
43. CUT A STANDARD LENGTH THREAD ON RIGID CONDUIT USING A DROP-HEAD RATCHET THREADER.							X	X		X	X	X	X	X				
44. MAKE BOX OFFSET BENDS IN RIGID CONDUIT USING A HICKEY.								X		X	X	X	X	X				
45. USE IN-THE-AIR TECHNIQUES TO BEND RIGID CONDUIT.								X		X	X	X	X	X				
46. MAKE A 90 DEGREE BEND IN RIGID CONDUIT.								X		X	X	X	X	X				
47. CORRECT AN OVERBEND IN RIGID CONDUIT.								X		X	X	X	X	X				
48. MAKE BACK-TO-BACK BENDS IN RIGID CONDUIT.								X		X	X	X	X	X				
49. BEND A 30 DEGREE OFFSET IN RIGID CONDUIT.								X		X	X	X	X	X				

COMPETENCY CHART

TRAINEE ____________________

INSTRUCTOR ____________________

COMPETENCY CHART FOR ELECTRICIAN CLUSTER

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	Date of Pre-Test	Date Competency Demonstrated	Instructor's Initials	Trainee's Initials	TELEVISON-CABLE INSTALLER HELPER (821.684-010)	ELECTRIC MOTOR ASSEMBLER (721.684-022)	PARTS CLERK (RT./WHOLE TR.) (279.357-062)	CONDUIT/PIPE INSTALLER (869.381-018)	EQUIPMENT INSTALLER HELPER (TELEPHONE) (822.664-010)	PROTECTIVE-SIGNAL-INSTALLER/REPAIRER HELPER (822.664-010)	ELECTRICIAN HELPER (ANY INDUSTRY) (829.684-022)	ELECTRICIAN, RESIDENT. (824.261-010) ENTRY LEVEL	ELECTRICIAN, COMMERCIAL (824.261-010) ENTRY LEVEL	ELECTRICIAN, INDUSTRIAL (824.261-010) ENTRY LEVEL				
50. BEND A 45 DEGREE OFFSET TO PASS AN OBSTRUCTION USING RIGID CONDUIT.								X		X	X	X	X	X				
51. MAKE A THREE BEND SADDLE USING RIGID CONDUIT TO CROSS OVER AN OBSTRUCTION.								X		X	X	X	X	X				
52. INSTALL AND SECURE RIGID CONDUIT.								X		X	X	X	X	X				
53. CUT AND DEBURR THIN-WALL CONDUIT TO LENGTH USING A HACKSAW AND A PIPE CUTTER.							X	X	X	X	X	X	X	X				
54. MAKE BOX OFFSET BENDS IN THIN-WALL CONDUIT USING AN EMT BENDER.								X	X	X	X	X	X	X				
55. USE IN-THE-AIR TECHNIQUES TO BEND THIN-WALL CONDUIT.								X	X	X	X	X	X	X				
56. MAKE A 90 DEGREE BEND IN THIN-WALL CONDUIT.								X	X	X	X	X	X	X				
57. CORRECT AN OVERBEND IN THIN-WALL CONDUIT.								X	X	X	X	X	X	X				
58. MAKE BACK-TO-BACK BENDS IN THIN-WALL CONDUIT.								X	X	X	X	X	X	X				
59. BEND A 30 DEGREE OFFSET IN THIN-WALL CONDUIT.								X	X	X	X	X	X	X				
60. BEND A 45 DEGREE OFFSET TO PASS AN OBSTRUC-																		

COMPETENCY CHART

TRAINEE ______________________

INSTRUCTOR ______________________

COMPETENCY CHART FOR ELECTRICIAN CLUSTER

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TION USING THIN-WALL CONDUIT.								X	X	X	X	X	X	X				
61. MAKE A THREE BEND SADDLE USING THIN-WALL																		
CONDUIT TO CROSS OVER AN OBSTRUCTION.								X	X	X	X	X	X	X				
62. INSTALL AND SECURE THIN-WALL CONDUIT.								X	X	X	X	X	X	X				
63. INSTALL AND SECURE PVC PLASTIC CONDUIT.								X	X	X	X	X	X	X				
64. INSTALL AND SECURE FLEXIBLE CONDUIT.								X	X	X	X	X	X	X				
65. INSTALL AND SECURE LIQUID TIGHT FLEXIBLE																		
CONDUIT.								X	X	X	X	X	X	X				
V. WIRING OPERATIONS																		
66. IDENTIFY COMMONLY USED WIRE AND CABLE.							X	X			X	X	X	X				
67. IDENTIFY COMMONLY USED ELECTRICAL BOXES.							X	X			X	X	X	X				
68. MOUNT ELECTRICAL OUTLET BOX TO STUD.											X	X	X	X				
69. INSTALL (BAR-HANGER) MOUNTED JUNCTION BOX.											X	X	X	X				
70. INSTALL SURFACE MOUNT SWITCH AND OUTLET																		
BOX ON A MASONRY WALL. (OPTIONAL)											X	X	X	X				
71. INSTALL GANGABLE BOXES.											X	X	X	X				

COMPETENCY CHART

TRAINEE ____________________

INSTRUCTOR ____________________

COMPETENCY CHART FOR ELECTRICIAN CLUSTER

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72. INSTALL RECESSED FIXTURE HOUSING IN CEILING.											X	X	X	X				
73. MAKE SPLICES USING MECHANICAL-TYPE CONNECTORS (SPLIT BOLT CONNECTORS, LUGS, AND WIRE NUTS).					X				X	X	X	X	X	X				
74. SOLDER AND TAPE A PIGTAIL AND T-SPLICE JOINT.										X	X	X	X	X				
75. IDENTIFY PROPER USES OF SWITCHES, RECEPTACLES AND FIXTURES.							X			X	X	X	X	X				
76. IDENTIFY AND INTERPRET ELECTRICAL SYMBOLS AND DIAGRAMS.					X			X	X	X	X	X	X	X				
77. DIAGRAM AND INSTALL A SINGLE 115V DUPLEX RECEPTACLE.												X	X	X				
78. DIAGRAM AND INSTALL SPLIT CIRCUIT WIRING FOR A SWITCHED DUPLEX RECEPTACLE.												X	X	X				
79. DIAGRAM AND INSTALL A GROUND-FAULT INTERRUPTER RECEPTACLE.												X	X	X				
80. DIAGRAM AND INSTALL A KEYLESS PORCELAIN LAMPHOLDER WITH SINGLE-POLE SWITCH TO BE																		

COMPETENCY CHART

TRAINEE ____________ INSTRUCTOR ____________ COMPETENCY CHART FOR ELECTRICIAN CLUSTER	Date of Pre-Test	Date Competency Demonstrated	Instructor's Initials	Trainee's Initials	TELEVISON-CABLE INSTALLER HELPER (821.684-010)	ELECTRIC MOTOR ASSEMBLER (721.684-022)	PARTS CLERK (RT./WHOLE TR.) (279.357-062)	CONDUIT/PIPE INSTALLER (869.381-018)	EQUIPMENT INSTALLER HELPER (TELEPHONE) (822.664-010)	PROTECTIVE-SIGNAL-INSTALLER/REPAIRER HELPER (822.664-010)	ELECTRICIAN HELPER (ANY INDUSTRY) (829.684-022)	ELECTRICIAN, RESIDENT. (824.261-010) ENTRY LEVEL	ELECTRICIAN, COMMERCIAL (824.261-010) ENTRY LEVEL	ELECTRICIAN, INDUSTRIAL (824.261-010) ENTRY LEVEL				
CONTROLLED FROM ONE LOCATION.												X	X	X				
81. DIAGRAM AND INSTALL SIX KEYLESS PORCELAIN LAMPHOLDERS TO BE CONNECTED IN SERIES.												X	X	X				
82. DIAGRAM AND INSTALL SIX KEYLESS PORCELAIN LAMPHOLDERS TO BE CONNECTED IN PARALLEL AND CONTROLLED BY DIMMER SWITCH.												X	X	X				
83. DIAGRAM AND INSTALL A LAMP FIXTURE WITH TWO THREE-WAY SWITCHES.												X	X	X				
84. DIAGRAM AND INSTALL A LAMP FIXTURE WITH TWO THREE-WAY AND ONE FOUR-WAY SWITCH TO BE CONTROLLED FROM THREE LOCATIONS.												X	X	X				
85. DIAGRAM AND INSTALL SIX DUPLEX RECEPTACLES WITH A THREE-WIRE SPLIT CIRCUIT.												X	X	X				
86. DIAGRAM AND INSTALL TWO TWO-TUBE FLUORESCENT LAMP FIXTURES USING AN OCTAGON OUTLET BOX WITH BRACKET TO BE CONTROLLED FROM TWO																		

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LOCATIONS.												X	X	X				
87. DIAGRAM AND INSTALL A PADDLE FAN.												X	X	X				
88. DIAGRAM AND INSTALL A LOW VOLTAGE TRANSFORMER																		
FOR DOOR BELL (CHIME) WITH TWO PUSH BUTTON																		
SWITCHES.										X		X	X	X				
89. DIAGRAM AND INSTALL A LOW VOLTAGE INTERCOM																		
SYSTEM.										X		X	X	X				
90. DIAGRAM AND INSTALL TELEPHONE/TELEVISION																		
SIGNAL SYSTEMS.					X				X	X		X	X	X				
91. MAKE AN EXTENSION CORD USING MALE AND FEMALE																		
CAPS.										X	X	X	X	X				
92. DIAGRAM AND INSTALL SPECIAL PURPOSE 220V																		
OUTLET FOR RANGE.												X	X	X				
93. DIAGRAM AND INSTALL SPECIAL PURPOSE 220V																		
OUTLET FOR WINDOW AIR CONDITIONER.												X	X	X				
94. DIAGRAM AND INSTALL A WATER HEATER WITH A																		

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24 HOUR TIMER.												X	X	X				
95. CALCULATE AND LIST GROUP LOADS FOR SERVICE ENTRANCE.												X	X	X				
96. INSTALL A SERVICE ENTRANCE 120-240V, SINGLE-PHASE WITH DISTRIBUTION PANEL.												X	X	X				
97. DIAGRAM AND INSTALL BRANCH CIRCUITS FROM DISTRIBUTION PANEL TO LIGHTS AND RECEPTACLE OUTLETS.												X	X	X				
98. DIAGRAM AND INSTALL 220V, SINGLE-PHASE 60 AMP FUSED DISCONNECT IN CONDUIT FROM MAIN PANEL TO DISCONNECT.												X	X	X				
99. TEST CIRCUITS AND INSTALL CIRCUIT BREAKERS IN DISTRIBUTION PANEL. MARK ALL CIRCUITS IN MAIN PANEL.												X	X	X				
100. CONNECT ALL CIRCUITS IN MAIN PANEL.												X	X	X				
101. TEST ALL CIRCUITS FOR GROUNDS WITH OHMMETER.												X	X	X				

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AND TURN ON BREAKER TO ENERGIZE CIRCUITS.												X	X	X				
102. TROUBLESHOOT AND REPLACE EXISTING CIRCUIT																		
BREAKERS.												X	X	X				
103. TROUBLESHOOT AND REPLACE EXISTING FUSES.												X	X	X				
104. TROUBLESHOOT AND REPLACE EXISTING																		
RECEPTACLES.												X	X	X				
105. TROUBLESHOOT AND REPLACE EXISTING SWITCHES.												X	X	X				
106. TROUBLESHOOT AND REPLACE EXISTING FLUORESCENT																		
BALLAST.												X	X	X				
107. TROUBLESHOOT AND REPLACE EXISTING FLUORESCENT																		
TUBES AND TUBE HOLDERS.												X	X	X				
108. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A																		
BEDROOM.												X	X	X				
109. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A																		
BATHROOM AND PASSAGE.												X	X	X				
110. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A																		

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HALL AND FRONT ENTRANCE.												X	X	X				
111. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A KITCHEN AND REAR ENTRY AND APPLIANCE CIRCUITS FOR KITCHEN.												X	X	X				
112. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A LIVING ROOM.												X	X	X				
113. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR THE DINING AREAS, PORCH, GARAGE, STORAGE AREA, AND ATTIC.												X	X	X				
114. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR A GARAGE.												X	X	X				
115. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR THE TERRACE, RECREATION ROOM, AND UTILITY ROOM.												X	X	X				
116. DIAGRAM AND WIRE A BRANCH CIRCUIT FOR THE LAVATORY, WORKSHOP, AND STORAGE ROOM.												X	X	X				
117. DIAGRAM AND INSTALL AN EMERGENCY (BELL)																		

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ALARM SYSTEM.										X		X	X	X				
118. DIAGRAM AND INSTALL A SMOKE DETECTOR.										X		X	X	X				
119. DIAGRAM AND INSTALL AN INTRUSION ALARM CIRCUIT USING MOTOR DETECTOR AND CLOSED OR OPEN LOOPED CIRCUIT.												X	X	X				
120. DIAGRAM AND INSTALL A BATTERY-OPERATED EMERGENCY LIGHTING SYSTEM.												X	X	X				
121. UNDERSTAND BASIC NEC REQUIREMENTS FOR THE WIRING OF SWIMMING POOLS, SPAS, HOT TUBS, AND MASSAGE BATH TUBS.												X	X	X				
122. UNDERSTAND COMMERCIAL BUILDING PLANS AND SPECIFICATIONS.													X	X				
123. UNDERSTAND ELECTRICAL SERVICE INSTALLATION PROBLEMS AND PRACTICES IN A COMMERCIAL SETTING.													X	X				
124. IDENTIFY SYMBOLS AND CALCULATE PLAN																		

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DIMENSIONS ON AN ELECTRICAL DRAWING OF A COMMERCIAL BUILDING.													X	X				
125. DETERMINE SIZE, PROTECTION, AND INSTALLATION OF BRANCH CIRCUITS AND FEEDERS.													X	X				
126. DETERMINE THE COMPONENTS AND CORRECT CONNECTIONS FOR LOW-VOLTAGE REMOTE-CONTROL LIGHTING.													X	X				
127. REVIEW PLANS AND DETERMINE JOB REQUIREMENTS ON AN ELECTRICAL DRAWING OF A COMMERCIAL ESTABLISHMENT.													X	X				
128. SELECT PROPERLY RATED SWITCHES AND RECEPTACLES FOR COMMERCIAL WIRING APPLICATIONS.													X	X				
129. DIAGRAM AND INSTALL CIRCUIT WITH A SINGLE-POLE SWITCH WITH FEED AT SWITCH.													X	X				
130. DIAGRAM AND INSTALL A WEATHER RESISTANCE																		

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TRAINEE ______ INSTRUCTOR ______ COMPETENCY CHART FOR ELECTRICIAN CLUSTER ______	Date of Pre-Test	Date Competency Demonstrated	Instructor's Initial	Trainee's Initials	TELEVISON-CABLE INSTALLER HELPER (821.684-010)	ELECTRIC MOTOR ASSEMBLER (721.684-022)	PARTS CLERK (RT./WHOLE TR.) (279.357-062)	CONDUIT/PIPE INSTALLER (869.381-018)	EQUIPMENT INSTALLER HELPER (TELEPHONE) (822.664-010)	PROTECTIVE-SIGNAL-INSTALLER/REPAIRER HELPER (822.664-010)	ELECTRICIAN HELPER (ANY INDUSTRY) (829.684-022)	ELECTRICIAN, RESIDENT. (824.261-010) ENTRY LEVEL	ELECTRICIAN, COMMERCIAL (824.261-010) ENTRY LEVEL	ELECTRICIAN, INDUSTRIAL (824.261-010) ENTRY LEVEL				
OR EXPLOSION PROOF LIGHT AND SWITCH IN RIGID CONDUIT.													X	X				
131. DIAGRAM AND INSTALL CIRCUIT WITH A SINGLE-POLE SWITCH WITH FEED AT LIGHT.													X	X				
132. DIAGRAM AND INSTALL CIRCUIT WITH TWO THREE-WAY SWITCHES CONTROLLING TWO LUMINARIES WITH SOURCE AT ONE LUMINAIRE.													X	X				
133. DIAGRAM AND INSTALL CIRCUIT WITH TWO THREE-WAY SWITCHES AND A FOUR-WAY SWITCH CONTROLLING A LIGHT.													X	X				
134. SELECT CORRECT MATERIALS FOR THE INSTALLATION OF BRANCH CIRCUIT WIRING.													X	X				
135. USE THE NEC TO KNOW HOW TO INSTALL APPLIANCE CIRCUITS IN A COMMERCIAL BUILDING.													X	X				
136. LIST MATERIALS FOUND IN AN ELECTRICAL DRAWING.													X	X				

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137. UNDERSTAND THE INSTALLATION REQUIREMENTS FOR A SURFACE METAL RACEWAY, MULTI-OUTLET ASSEMBLIES, COMMUNICATION CIRCUIT AND FLOOR OUTLETS.													X	X				
138. DIAGRAM AND INSTALL A SINGLE-POLE SWITCH WITH LIGHT USING SURFACE METAL RACEWAY.													X	X				
139. DIAGRAM AND INSTALL THREE RECEPTACLE OUTLETS USING SURFACE METAL RACEWAY.													X	X				
140. PERFORM BRANCH CIRCUIT CALCULATIONS FOR A COMMERCIAL BUILDING.													X	X				
141. LIST THE PARTS, TYPES, AND OPERATING CHARACTERISTICS OF LAMPS USED IN COMMERCIAL BUILDING.							X						X	X				
142. UNDERSTAND HOW TO INSTALL LIGHTING OUTLETS AND FIXTURES IN A COMMERCIAL SETTING.													X	X				
143. DIAGRAM AND KNOW HOW TO CONNECT OWNER'S																		

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CIRCUITS FOR A COMMERCIAL BUILDING.													X	X				
144. UNDERSTAND INSTALLATION REQUIREMENTS FOR EMERGENCY POWER SYSTEMS.													X	X				
145. USE NEC TO SELECT PROPER FUSES AND CIRCUIT BREAKERS IN A COMMERCIAL SETTING.							X						X	X				
146. COMPLETE SHORT-CIRCUIT CALCULATIONS.													X	X				
147. SELECT A PANEL BOARD AND FEEDER SIZE GIVEN THE BRANCH CIRCUITS AND LOAD.													X	X				
148. READ AND INTERPRET SITE PLANS.																		
149. IDENTIFY PARTS OF A UNIT SUBSTATION AND SELECT PROPER CONNECTIONS.														X				
150. IDENTIFY DIFFERENT TYPES OF BUSWAYS AND LIST COMPONENTS.							X							X				
151. IDENTIFY BASIC FUNCTIONS OF ELECTRIC PANEL.														X				
152. UNDERSTAND HOW TO INSTALL TROLLEY BUSWAYS.														X				
153. DESCRIBE HOW TO INSTALL SIGNALING SYSTEMS.														X				

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154. DESCRIBE THE VARIOUS TYPES OF MOTORS AND CONTROLLERS USED IN AN INDUSTRIAL SETTING.							X							X				
155. IDENTIFY LIGHTING PROTECTION PROCEDURES USED IN AN INDUSTRIAL SETTING.														X				
156. DESCRIBE BASIC OPERATIONS OF PROGRAMMABLE LOGIC CONTROLLERS.														X				
VI. ELECTRIC MOTORS AND CONTROLS																		
157. IDENTIFY BASIC PARTS OF A THREE-PHASE SQUIRREL-CAGE INDUCTION MOTOR.						X	X							X				
158. DESCRIBE HOW ELECTROMECHANICAL AND SOLID-STATE RELAYS WORK.														X				
159. DEFINE THE OPERATIONS OF AN ACROSS-THE-LINE STARTER AND UNDERSTAND ITS BASIC APPLICATIONS.														X				
160. DEFINE THE BASIC USE OF A MANUAL STARTING COMPENSATOR.														X				

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161. IDENTIFY THE BASIC PARTS AND MAJOR APPLICATIONS OF A THREE-PHASE, WOUND-ROTOR INDUCTION MOTOR.														X				
162. IDENTIFY THE BASIC USE AND APPLICATION OF MANUAL SPEED CONTROLLER.														X				
163. IDENTIFY THE BASIC TYPES OF CONTROLLERS AND THEIR APPLICATION USED ON THREE-PHASE AC MOTORS.														X				
164. UNDERSTAND BASIC MOTOR MAINTENANCE ACTIVITIES.						X								X				
165. PERFORM CONTINUITY TEST FOR MOTOR WINDINGS ON A THREE-PHASE AC MOTOR.														X				
166. REPLACE AND LUBRICATE SLEEVE AND/OR BALL BEARINGS ON AN AC MOTOR ACCORDING TO MANUFACTURER'S SPECIFICATIONS.						X								X				
167. CLEAN AND LUBRICATE AN AC MOTOR ACCORDING TO																		

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MANUFACTURER'S SPECIFICATIONS.						X								X				
168. DESCRIBE THE OPERATION OF BASIC SINGLE-PHASE INDUCTION MOTORS.														X				
169. IDENTIFY AND DESCRIBE THE BASIC OPERATION AND CONSTRUCTION OF REPULSION MOTORS.														X				
170. UNDERSTAND THE BASIC OPERATIONS OF A UNIVERSAL MOTOR.														X				
171. UNDERSTAND THE BASIC PRINCIPLES OF MOTOR CONTROL.														X				
172. UNDERSTAND THE BASIC OPERATIONS OF MANUAL STARTERS.														X				
173. DESCRIBE THE BASIC OPERATION OF MAGNETIC STARTERS.														X				
174. IDENTIFY THE BASIC APPLICATIONS OF A PUSH BUTTON CONTROL DEVICE.														X				
175. IDENTIFY THE OPERATION AND USE OF MAGNETIC																		

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RELAYS AND CONTACTORS.																		
176. IDENTIFY THE BASIC TYPES AND OPERATIONS OF																		
TIMING RELAYS.																		
177. DESCRIBE CONNECTIONS NECESSARY TO STOP																		
MOTORS USING PRESSURE SWITCHES AND REGULA-																		
TORS.																		
178. DESCRIBE THE BASIC FUNCTIONS OF FLOAT																		
SWITCHES.																		
179. DESCRIBE THE BASIC FUNCTIONS OF FLOW																		
SWITCHES.																		
180. DESCRIBE THE USE OF LIMIT SWITCHES.																		
181. DESCRIBE THE PURPOSE OF PHASE FAILURE																		
RELAYS.																		
182. DESCRIBE THE FUNCTION OF TWO-WAY AND FOUR-																		
WAY SOLENOID VALVES.																		
183. IDENTIFY THE BASIC USES OF TEMPERATURE																		

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	Date of Pre-Test	Date Competency Demonstrated	Instructor's Initials	Trainee's Initials	TELEVISON-CABLE INSTALLER HELPER (821.684-010)	ELECTRIC MOTOR ASSEMBLER (721.684-022)	PARTS CLERK (RT./WHOLE TR.) (279.357-062)	CONDUIT/PIPE INSTALLER (869.381-018)	EQUIPMENT INSTALLER HELPER (TELEPHONE) (822.664-010)	PROTECTIVE-SIGNAL-INSTALLER/REPAIRER HELPER (822.664-010)	ELECTRICIAN HELPER (ANY INDUSTRY) (829.684-022)	ELECTRICIAN, RESIDENT. (824.261-010) ENTRY LEVEL	ELECTRICIAN, COMMERCIAL (824.261-010) ENTRY LEVEL	ELECTRICIAN, INDUSTRIAL (824.261-010) ENTRY LEVEL				
SWITCHES.														X				
184. IDENTIFY THE BASIC SYMBOLS USED IN MOTOR CONTROL SCHEMATICS AND DIAGRAMS.														X				
185. INTERPRET AND DRAW BASIC LINE DIAGRAM.														X				
186. UNDERSTAND FUNCTIONS AND APPLICATIONS OF TWO-WIRE CONTROL DEVICES.														X				
187. UNDERSTAND THE BASIC APPLICATIONS OF THREE-WIRE AND SEPARATE CONTROL CIRCUITS.														X				
188. UNDERSTAND THE APPLICATION OF HAND-OFF AUTOMATIC CONTROL DEVICES.														X				
189. INTERPRET LINE DIAGRAMS USING MULTIPLE PUSH-BUTTON STATIONS.														X				
190. INTERPRET WIRING AND LINE DIAGRAMS OF REVERSING AND INTERLOCKING CONTROLS.														X				
191. UNDERSTAND SEQUENCE CONTROL OPERATIONS WITH MOTORS.														X				

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192. DEFINE THE PROCESS, PURPOSE AND OPERATION OF JOGGING CONTROLS.														X				
193. UNDERSTAND THE BASIC OPERATION OF DIRECT AND PULLEY DRIVES.														X				
194. DEFINE THE FUNCTION AND APPLICATION OF GEAR MOTORS.														X				
195. UNDERSTAND THE USE AND OPERATION OF VARIABLE FREQUENCY DRIVES.														X				
196. UNDERSTAND THE BASIC OPERATIONS AND APPLICATIONS OF MAGNETIC CLUTCHES AND DRIVES.														X				
197. UNDERSTAND THE BASIC OPERATIONS OF DC VARIABLE SPEED CONTROL MOTOR DRIVES.														X				
198. DEMONSTRATE MOTOR START-UP AND TROUBLESHOOTING KNOWLEDGE.														X				
199. DIAGRAM AND CONNECT A SWITCH TO OPERATE A RELAY AND MOTOR.														X				

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200. DIAGRAM AND CONNECT A SEPARATE CONTROL CIRCUIT TO OPERATE A MOTOR.														X				
201. DIAGRAM AND CONNECT A PUSH-BUTTON STATION TO OPERATE A RELAY AND MOTOR.														X				
202. DIAGRAM AND CONNECT A MECHANICALLY HELD RELAY TO CONTROL A LIGHTING LOAD.														X				
203. DIAGRAM AND CONNECT A SELECTOR SWITCH AND A PRESSURE SWITCH TO OPERATE A RELAY AND LOAD.														X				
204. DIAGRAM AND CONNECT TWO PUSH-BUTTON STATIONS TO OPERATE A RELAY AND LOAD.														X				
205. DIAGRAM AND CONNECT TWO-PUSH-BUTTON STATIONS TO OPERATE A RELAY AND MOTOR SO ONE MUST START BEFORE THE OTHER.														X				
206. DIAGRAM AND CONNECT TWO PUSH-BUTTON STATIONS TO OPERATE A RELAY AND MOTOR																		

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SO ONLY ONE CAN WORK AT A TIME THROUGH																		
AUXILIARY CONTACT INTERLOCKS.																		
207. DIAGRAM AND CONNECT A MOTOR START-STOP																		
AND JOG-PUSH-BUTTON CONTROL STATION.																		
208. DIAGRAM AND CONNECT A START-STOP JOGGING																		
CIRCUIT USING A TWO-POSITION SELECTION																		
SWITCH.																		
209. DIAGRAM AND CONNECT A REVERSING CONTROL																		
PUSH-BUTTON INTERLOCK.																		
210. DIAGRAM AND CONNECT TWO FORWARD AND TWO																		
REVERSE CONTROL STATIONS WITH PUSH-																		
BUTTON AND AUXILIARY CONTACT INTERLOCK.																		
211. DIAGRAM AND CONNECT A FORWARD-REVERSE																		
CONTROL CIRCUIT WITH JOGGING IN EACH																		
DIRECTION.																		